Summary of Catch Monitoring Programs for Commercial Salmon Fisheries in Southern B.C., 1998-2002

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SUMMARY OF CATCH MONITORING PROGRAMS FOR COMMERCIAL SALMON FISHERIES IN SOUTHERN B.C., 1998-2002

by

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ABSTRACT

Beaith, B., Hop Wo, L., Kearey, L., Bennett, W.R., and Federenko, A. 2004. Summary of catch monitoring programs for commercial salmon fisheries in Southern B.C., 1998-2002. Can. Manuscr. Rep. Fish. Aquat. Sci. 2697: viii + 45 p.

From 1998-2002 South Coast commercial salmon fisheries have been monitored by Fisheries & Oceans Canada through several programs. Logbook/phone-in and commercial observer programs have emerged as the two main reporting programs used to estimate catch in the majority of South Coast commercial salmon fisheries. Participation in the logbook/phone-in program increased in most fisheries, while observer coverage decreased in most fisheries. The decrease in observer coverage from 1998-2002 was due to the reduction in available funding levels required to monitor fisheries. As of 2002, the logbook/phone-in program monitored all commercial salmon fisheries in the South Coast area, and the observer program monitored fisheries with the highest impact on salmon stocks of concern.

Differences in catch estimates from the logbook and observer programs were observed in all fisheries monitored and in most of these fisheries (16 of 22) observer catch estimates were higher than those in the logbook program (1-22%).

Serious coho concerns from 1998-2002 dictated fishery management objectives in South Coast fisheries to minimize coho encounters in all license areas. Retention of coho was not permitted during any commercial salmon fishery and revival tanks became a necessity on most fishing vessels. Coho releases from vessels using revival tanks showed significant improvement in condition after being held in revival tanks. Encounters of coho increased between 1998-2002 for most licence areas, and marked coho became an increasingly larger component of the total coho encounters through 2002.

Chinook concerns in 1998-2002 primarily focussed on protecting local WCVI stocks and fishery management objectives were in place to reduce the impact on these chinook by South Coast commercial salmon fisheries. Chinook releases from vessels using revival tanks showed significant improvement in condition after being held in revival tanks. Chinook encounters for most licence areas from 1998-2002 remained relatively constant, but increased slightly in the Area D gillnet fishery and increased dramatically in the Area G troll fishery.

RÉSUMÉ

Beaith, B., Hop Wo, L., Kearey, L., Bennett, W.R., and Federenko, A. 2004. Summary of catch monitoring programs for commercial salmon fisheries in Southern B.C., 1998-2002. Can. Manuscr. Rep. Fish. Aquat. Sci. 2697: viii + 45 p.

De 1998 à 2002, Pêches et Océans Canada a surveillé les pêches commerciales du saumon de la côte sud par le biais de plusieurs programmes. Le programme de déclaration par téléphone des prises consignées dans les journaux de bord et le programme des observateurs pour la pêche commerciale sont devenus les deux programmes de déclaration les plus utilisés pour estimer les prises dans la plupart des pêches commerciales du saumon de la côte sud. La participation au programme de déclaration par téléphone a augmenté dans la plupart des pêches, tandis le nombre d'observateurs y a diminué. La baisse remarquée entre 1998 et 2002 est attribuable à une diminution des niveaux de financement disponibles pour la surveillance des pêches. À partir de 2002, toutes les pêches commerciales du saumon de la côte sud ont été surveillées par le biais du programme de déclaration par téléphone, alors que le programme des observateurs était utilisé uniquement pour les pêches ayant les effets les plus graves sur les stocks de saumons menacés.

Des différences entre l'estimation des prises obtenue par le biais du programme de déclaration par téléphone et du programme des observateurs ont été signalées dans toutes les pêches surveillées; pour la plupart d'entre elles (16 sur 22), les estimations faites par les observateurs étaient plus élevées que celles déclarées dans les journaux de bord (une différence de 1 à 22 %).

De 1998 à 2002, les objectifs de gestion des pêches de la côte sud ont été dictés par d'importantes préoccupations quant à l'état des stocks de cohos; on espérait réduire au minimum les rencontres de cohos dans tous les secteurs pour lesquels des permis de pêche sont attribués. La rétention de ce poisson a été interdite dans toutes les pêches commerciales du saumon et la plupart des bateaux de pêche ont dû être équipés de viviers pour les captures accidentelles. Il a été constaté que les cohos relâchés après avoir été placés dans de tels viviers sont en bien meilleure condition que les autres. Les rencontres de cohos ont augmenté de 1998 à 2002 dans la plupart des secteurs visés par un permis et, tout au long de 2002, la place occupée par les cohos marqués dans l'ensemble de ces rencontres est devenue de plus en plus importante.

Les mesures prises pour protéger le saumon quinnat de 1998 à 2002 ont été axées principalement sur la protection des stocks locaux de la côte ouest de l'île de Vancouver; des objectifs de gestion des pêches ont été instaurés afin de réduire l'incidence des pêches commerciales du saumon de la côte sud sur ces poissons. Il a été constaté que les saumons quinnats relâchés après avoir été placés dans des viviers pour les captures accidentelles sont, eux aussi, en bien meilleure condition que ceux ayant été relâchés par des bateaux ne disposant pas de tels viviers.
Les rencontres de saumons quinnats sont demeurées relativement constantes dans la plupart des secteurs visés par des permis entre 1998 et 2002, mais elles ont légèrement

augmenté dans les pêches au filet maillant du secteur D et ont grandement augmenté dans les pêches aux lignes du secteur G.

INTRODUCTION

In the Pacific Region (BC) official catch reporting for commercial salmon fisheries has been conducted since the early 1950's. The initial reporting methods focussed on summarizing the salmon landing reports (sales slips) that were generated at processing plants when fishers offloaded their catch. The sales slips documented the quantity, value and species of the catch, and were forwarded to the Department of Fisheries and Oceans (DFO) for data processing. Limited cold-storage technology in early fisheries forced salmon fishers to offload their catch frequently, resulting in sales slip data being produced on a weekly basis, and the overall volume of data often required months to compile and analyze.

With the advent of larger fishing vessels, and improved cold-storage and other fish preservation techniques, catch deliveries became less frequent and landings at non-traditional sites more common. Changes were also starting to happen in the traditional methods of selling of catch. Previously, commercial fishers sold their fish directly to fish brokers, distributors and processors, thereby generating sales slips. Commercial fishers began marketing their own products directly to consumers, often generating no sales slips from the sale of commercially caught salmon.

As a result of infrequent offloads by fishing vessels at different locations, and the decreasing amount of documented fish sales, the sales slip system for the commercial salmon fishery in the South Coast area became less dependable. Further challenges for the sales slip system were magnified in the 1990's due to the conservation concerns for coho, chinook and steelhead, due to the fact that the sales slip program dealt only with the landed product and did not address the fish discarded at sea. The inability of the sales slip program to collect this type of critical information made it clear that new catch monitoring programs were required to collect accurate catch and bycatch information and address the changes taking place in commercial salmon fisheries.

In June 1998, the Minister of Fisheries and Oceans announced a plan to rebuild the salmon resource, restructure the fisheries, and help people and communities to adjust to the changing fishery. The plan included the newly developed Logbook and Observer programs created jointly for the South Coast fisheries in 1998 to help meet the catch monitoring goals required by DFO. These two programs were designed to collect accurate information on commercial salmon catch from fishers (via logbook program) and independent observers (via observer program) in a timely manner, and make the data available to users within DFO.

In addition to the above major Logbook and Observer programs for catch monitoring, other catch monitoring programs were utilized, such as the newly developed Workbook Program and the pre-existing Mark Recovery Program.

Mass-marking of coho and chinook at large US hatchery started in the late 1990s, resulting in significant numbers of these marked fish appearing in the South Coast fisheries beginning in 2001 for coho and 2002 for chinook. Observers and fishers were requested to estimate and record mark-rates for these species harvested in BC South Coast fisheries. Mark-rate information can be used to manage selective mark-only

fisheries and, when combined with coded-wire-tag information, can be used to estimate ocean survival, migratory patterns, hatchery contributions and exploitation rates.

Each of these monitoring tools provides information to DFO to help manage salmon fisheries. During catch monitoring in South Coast, these various programs are used in combination, and depending on a given fishery and the associated stocks of concern, different management approaches may be employed.

Catch and sample information collected by DFO through the various monitoring programs, is centralized in a Fisheries Operating System (FOS) database. This information is available in-season to fishery managers who estimate catch and manage fisheries based on catch information. Timely information is required to monitor fisheries that pose potential risks to species of concern. During commercial fisheries involving stocks of high concern, fishers are often requested to report information several times each day in order to provide the most up-to-date information for fishery managers who make decisions on openings, closures and restrictions. For commercial fisheries where minimal impacts on species of concern are expected, less frequent reporting (daily or weekly) provides an adequate source of information for managing these fisheries.

This report describes the various Catch Reporting Programs currently used to monitor the South Coast commercial salmon fisheries, and provides program results for the 1998 to 2002 period.

The information on salmon catch is presented for five licence areas (B,D,E,G,H) in Southern BC, which represent all three commercial gear types (seine, gillnet and troll) (Fig. 1). Much of the information presented in this report was previously reported in the Annual Summary Reports (Fisheries and Oceans Canada 1999, 2000, 2001, 2002, 2003).

FISHERIES OF CONCERN

South Coast stock assessment provides each year, pre-season outlook documents that indicate salmon stocks of concern for the upcoming year (Appendix 1). This pre-season outlook provides fishery managers with information to help assess impacts on stocks of concern from potential commercial fisheries. Based on this assessment, managers have the necessary information make adjustments to commercial fisheries to minimize impacts on stocks of concern.

The potential impact of specific commercial fisheries on stocks of concern can then be re-forecasted, based on the timing and location of fisheries that may impact these stocks, thereby becoming **fisheries of concern**. Table 1 shows the ranking of fisheries of concern for the 2002 season, and the associated commercial catch monitoring that took place that year. Appendix 2 provides a detailed evaluation of each fishery and the associated stocks of concern for the 2002 season.
Sufficient funding levels were not available to completely monitor all commercial salmon fisheries in the South Coast from 1998-2002. The impacts of commercial fisheries on stocks of concern was forecasted and resources were allocated to monitor select fisheries. Monitoring effort and resources (particularly observer coverage) were allotted to those

commercial fisheries that pose the highest potential risk to the largest number of species of concern.

The potential impacts on stocks of concern by high-risk commercial fisheries can be minimized through in-season management actions, which make adjustments in the timing, location and harvest levels of commercial fisheries.

LOGBOOK PROGRAM

DESCRIPTION OF THE LOGBOOK PROGRAM

The logbook program was initiated in 1998 on the South Coast (2001 on the North Coast), and continues to be in place. The program was developed to provide improve catch reporting and address bycatch concerns for non-target species, and is the largest monitoring program used to estimate the commercial salmon catch in B.C.

All commercial seine, gillnet, and troll salmon fishers are legally required to collect and report in their logbooks, the catch and release information of target and non-target species. This information is phoned-in during the season via cellular phone, satellite phone or VHF. Some fisheries require catch to be reported daily, while in most fisheries catch can be reported after the closure of the fishery. The completed logbooks are mailed-in to the service provider at the end of the season.

Logbook data consist primarily of fishing effort in disclosed locations, and catch summaries by species. Phoned-in data are received by a service provider who inputs the information into a regional computer network known as the Fishery Operating System (FOS). These data are made available to DFO staff on a daily basis for calculation of catch estimates. The logbook / phone-in information, in combination with other fishery data, allows the fishery managers to make quick and effective in-season management decisions.

As a fisheries management tool the logbook program, which is mandatory to all commercial fishermen, provides a large and cost-effective sample size of the overall fleet.

LOGBOOK PROGRAM RESULTS

Logbook Coverage by Licence Area

The annual logbook / phone-in coverage by licence area is shown for 1998 to 2002 in Table 2. Logbook coverage was calculated as the total number of logbook phone-ins received divided by the total days fished. The 5-year (1998-2002) average logbook coverage ranged from a high of 85% for the Area H troll fleet to a low of 65% for the Area E gillnet fleet. Considerable annual variation in logbook coverage was present in most licence groups, except for Troll Areas G and H which consistently reported relatively high coverage for all years. Total effort estimates (charter patrolmen, overflights, etc.) are collected in each fishery and are compared to the reported logbook information to determine the logbook coverage.

Since 1998, participation in the logbook reporting program has improved significantly, with the highest reported coverage for all gear types over a 5 year period coming in 2002 (Table 2). The familiarity with the logbook monitoring program is increasing with time and the commercial salmon fishers are showing promising levels of commitment to report their catch accurately.

Logbook Catch Estimates by Licence Area, Fishery

Catch estimates from the logbook program are shown by licence area and year in Table 3. The total annual catch for all areas combined declined substantially from 1998 to 2001, then increased significantly in 2002. The low catch in 1999 was due to closure of the Area B seine fishery which traditionally has the largest commercial catch. This closure was in response to a forecasted low abundance of target species (sockeye and chum). The combined sockeye and chum catch for all South Coast Licence Areas in 1999 was also the lowest in the 5-year period between 1998 and 2002 (Table 3). Total catch estimates are produced for each fishery by expanding the reported logbook catch to total effort.

OBSERVER PROGRAM

DESCRIPTION OF THE OBSERVER PROGRAM

The observer program was initiated on the South Coast in 1998, to operate in conjunction with the logbook program. Unlike the logbook program which involves the entire fishing fleet, the observer program randomly places observers on a portion of the commercial fleet. This program provides an independent, detailed and accurate record of the catch and encounters of all species for those fishing vessels that are boarded by observers.

The data collected by observers are used to corroborate the commercial logbook data and provide independent catch estimates for a given fishery, particularly where certain bycatch species are of concern. If observer catch estimates are shown to differ significantly from logbook catch estimates, more observers may be required for that fishery. As well as providing estimates of catch from the commercial fleet, observers also provide valuable biological samples from specific fisheries as requested. Trained observers collect data at-sea and report the results to DFO on a daily basis. Observer data summaries are phoned-in via cellular phone, satellite phone or VHF. At the end of each deployment period, the completed observer data-sheets are mailed-in, faxed or dropped off, as required.

During some fisheries in remote areas where communication may be difficult, it may be more efficient to transmit the daily observer summaries to observer providers who in turn relay the data to DFO at the nearest opportunity. For the 1998 to 2002 period, DFO contracted a number of service providers (Appendix 3) to provide observer coverage for the Southern BC commercial salmon fisheries.

Observer coverage is costly and as a result low numbers of observers are deployed in each fishery opening depending on available funding and expected levels of fishing effort and bycatch. Fisheries & Oceans Canada analyzes fisheries pre-season to determine which fisheries will require observer coverage and to what level.

From 1998 to 2002, the cost of observers for all full-fleet commercial fishing opportunities was funded by DFO, with industry making either full or partial payments for observer coverage on selective fishing projects. In the future, fishers will be required to pay for observer coverage. It is therefore in their best interest to report catches accurately via logbooks in order to minimize the necessary observer coverage. Fisheries and Oceans Canada is currently working on goals and mechanisms that will make catch monitoring more cost recoverable.

OBSERVER PROGRAM RESULTS

Observer Coverage by Licence Area

From 1998 to 2001, observers were deployed in most Southern BC commercial salmon fisheries within licence areas B,D,E,G and H. Fishing areas that were monitored included Queen Charlotte Strait, Johnstone Strait, Strait of Georgia, Mainland Inlets, Barkley Sound, Fraser River, Nitinat, West Coast Vancouver Island and Nootka Sound/ Esperanza Inlet (Fig. 1).

Annual observer coverage for the period 1998 to 2001 was calculated as the number of observer boat-days monitored, divided by the days fished. The 4-year (1998-2001) average observer coverage for each licence area ranged from a high of 10% for Area B seine to a low of 5 % for Area E gillnet (Table 4). Observer coverage showed a declining trend over the 4-year period, with the lowest coverage for most Areas being reported in 2001.

In 2002, observers were deployed in selected fisheries only, and coverage by licence area is shown for 2002 in Table 5. This select coverage was due to the catch monitoring group attempting to maximize the observer effectiveness with the limited resources available. In 2002 the catch monitoring group identified potential fisheries of concern and allocated observer coverage to those fisheries that were thought to be critical. These fisheries were identified by forecasting the impacts of fisheries on recognized stocks of concern and the majority of the observer effort in 2002 focused on the top six fisheries of concern (Table 1).

Observer effort was increased in fisheries where bycatch and compliance were of concern, and decreased in areas where bycatch and compliance were of lesser concern.

Low observer coverage compromises the accuracy of the data collected from this program as the precision of observer data decreases with small sample sizes. If funding levels are not sufficient, changes in catch monitoring program will be required in order to provide accurate estimates of commercial catch.

Observer Catch Estimates by Licence Area, Fishery

Catch estimates from the observer program are shown by licence area, year and species in Table 6 and 7. Observer catch estimates were the lowest in 1999 for the same reasons as outlined above for the logbook program (no seine fishery in 1999). Total catch estimates were not available for the 2002 observer program due to selective resources allocation

that year, and catch estimates are provided for only selectively observed fisheries (Table 7).

Comparison of Observer and Logbook Coverage and Catch Estimates

The average annual observer coverage for the combined licence areas declined from 7% in 1998 to 3% in 2002 (Tables 8,9). Even though the 3% coverage in 2002 targeted individual fisheries at higher levels, it still represents an overall decline in observer coverage in commercial salmon fisheries. From 1998-2002 the average logbook coverage for the combined licence areas increased from 61% in 1998 to 86% in 2002. The increase in compliance in the logbook program, coupled with decline in observer coverage has positioned the logbook program to be the primary source for catch estimates.

Table 10 compares the observer and logbook catch estimates by year and licence area for all species combined (retained and released) for the 1998 to 2001 period. Table 11 compares the observer and logbook catch estimates by licence area, for all species combined (retained and released) for 2002. Catch data are based on expanded estimates and are extrapolated to account for all participating vessels, with total fishing effort estimated from DFO overflights and on-water gear counts.

From 1998-2002 for each licence area, the difference between the observer and logbook catch estimates ranged from 0% to 22% (Tables 10, 11). In the majority of cases (19 of 26 data pairs), the observer estimates were higher than the logbook estimates. The largest difference between observer and logbook estimates was found in gillnet Area E (15%) and the smallest difference was found in gillnet Area D (5%). For 1998-2001 for all licence areas, the total salmon catch estimates were 11 million pieces for the observer program and 10.2 million pieces for the logbook program. This represents a difference of 0.8 million pieces or 9% (Tables 10, 11).

In some cases, the discrepancy between the observer and logbook catch estimates may be explained by low observer coverage and the statistical errors which occur when relatively few observer reports are expanded to estimate the total catch in a given fishery. For example in 2000, Area E Gillnet had an observer coverage of only 3% compared to a much higher logbook coverage of 78% (Table 8), and showed a particularly high difference of 21% between the two catch estimates (Table 10). In other cases, the discrepancy between the two catch estimates may be due to fisherman under-reporting catch, or observers over-reporting catch.

Bijsterveld et al. (2002) used 1999-2000 catch data for commercial salmon fisheries to examine the discrepancies between the observer and logbook catch estimates for individual salmon species. Those authors also observed that the observer catch estimates were generally higher than the logbook estimates. Further, the percent difference between the two estimates was lower for the more abundant, target species (sockeye and chum, but not pinks) and considerably higher for the less abundant, typically non-target species (chinook, coho, steelhead). Those authors suggested that the large discrepancy for pink salmon was likely due to a small observer sample size, combined with a highly variable pink catch for individual vessels. The low discrepancy for Atlantic salmon, despite their low abundance, was likely due to the distinct and hence easily recognizable appearance of this species (Bijsterveld et al. (2002)

WORKBOOK PROGRAM

DESCRIPTION OF THE WORKBOOK PROGRAM

The workbook program was initiated in 2001 to collect from commercial fishers catch information set-by-set, rather than as a pooled daily total, as provided by the logbook program. Only the gillnet fleet was involved in the first year of this program. The workbook program was received with moderate success and was expanded in 2002 to include all commercial gear types. Fishers voluntarily collect set-by-set catch information in their respective fisheries (in addition to the logbook data), and record the data in the workbooks provided.

The workbook information supplements the data collected through the other catch reporting programs. The collected information is similar to that obtained from the observer program, and includes data such as coho mark rates and chinook release mortalities, not obtained through the logbook program. Fishers submit the workbook data to DFO at the end of the fishing season, and the information is entered into a fisheries database for comparison with data from other catch monitoring programs.

WORKBOOK PROGRAM RESULTS

Workbook Coverage

Participation levels in the workbook program are modest but increasing, and the collected information is valuable for aspects such as daily catch variation and set-by-set information. In 2002, twelve vessels (9 gillnet, 2 seine and 1 troll) participated in this program in varying degrees of effort, from 1 to 34 days and from 8 to 230 sets for each vessel (Table 12). For 2002, the workbook program had an average coverage of 2.6% in those fisheries where workbooks were utilized.

Workbook Catch Estimates by Licence Area, Fishery

Catch estimates from the workbook program can be compared to data from the other catch monitoring programs, assuming that the observed differences between catch estimates are related to variation in fisheries and not to variation in the reporting method. We investigated the differences between the workbook and logbook catch values by species for each of the 12 fishing vessels participating in the workbook program in 2002, and found that the differences for each vessel were relatively minor (Table 12). When all fishing vessels and gear types were combined for a given species, the differences between the workbook and logbook catch values were within 1% of each other for the more abundant species (sockeye, pink, chum) and somewhat higher for the less abundant species (4% for chinook-kept and 9% for coho-released) (Table 12). Based on these findings, the reported catch information between monitoring methods is quite consistent, and the variation in estimated catch is most likely attributed to the fishery.

Catch estimates from each of the workbook and observer programs were compared to catch estimates from the logbook program, using the 2002 data (Table 13). For this comparison, the fishing effort for all three reporting programs was standardized and the logbook catch was normalized to 100%. The logbook data were used as the standard values for this comparison as these records are considered to be the most accurate of the three data sets as indicated by the high logbook coverage of 86% for 2002 compared to

only about 3% for the observer program (Table 8) and <3% for the workbook program, for fisheries where workbooks were utilized.

Table 13 shows that the workbook catch estimates were generally within 10-20% of the logbook catch estimates for target species (sockeye, chum) which had abundant catch data available. The workbook catch estimates were less reliable for bycatch species (coho, chinook, steelhead) which had limited catch data and a high variability in individual catches. For these bycatch species, the differences between the two catch estimates were large, indicating that the workbook data alone should not be relied on for catch monitoring.

2002-2003 DFO MARK RECOVERY PROGRAM

DESCRIPTION OF THE 2002-2003 DFO MARK RECOVERY PROGRAM

The Mark Recovery Program (MRP) in the South Coast area monitors commercial salmon fisheries where chinook and coho are targeted directly, or retained as bycatch. The MRP is designed to recover coded-wire tags (CWT's) from chinook and coho targeted or caught as bycatch in all South Coast salmon fisheries. Sampling programs are setup coastwide to collect these tags from commercial fisheries sampling a minimum of 20% of the catch.

During 1998 to 2001, the Mark Recovery Program for all South Coast salmon fisheries was provided through a service contractor who was responsible for sampling these fisheries, compiling and analysing the CWT data, and reporting the results to DFO. In 2002, DFO's South Coast Stock Assessment Division (STAD) undertook a portion of the MRP program, as a cost-saving and efficiency measure, which consisted of sampling the fall and winter components of the West Coast Vancouver Island Area G troll chinook fishery (Demko and Beaith, 2002). Fish heads containing CWT's were submitted to the contractor supplied laboratory for CWT recovery, data analysis and reporting. Presently, South Coast STAD continues to operate this portion of the Mark Recovery Program.

RESULTS OF THE 2002-2003 DFO MARK RECOVERY PROGRAM

The 2002-2003 period represents the first year of the DFO-MRP program. The Area G chinook troll fisheries that were conducted from October 2002 to March 2003 were sampled by South Coast Stock Assessment Division in accordance with the MRP requirements. During the 6-month monitoring period, nearly half of the Area G troll catch (18,351) was sampled, with monthly sampling coverage averaging 52% (range 39% in March to 61% in January) (Table 14).

The monthly proportion of clipped fish in the sampled catch averaged 33% (range 21% to 41%) (Table 15). The monthly proportion of fish with detected CWT's averaged 10%, (range 8% to 13%). The December to February samples which were obtained mainly from Area 23 (inshore) had a relatively higher number of CWT's (monthly average of 12%), while the October, November and March samples which were obtained from Area 123 (offshore) had comparatively fewer CWT's (monthly average of 9%) (Table 15).

COHO AND CHINOOK MONITORING PROGRAMS

Mark rates are monitored in commercial fisheries to provide encounter estimates of hatchery stocks. The hatchery component in commercial fisheries can be used for implementing hatchery retention and is valuable for the management of that fishery.

Mark Recovery Rates for Coho

Coho mark rates are shown by licence area and gear type for each of the observer and logbook programs in Table 16 for 2001 and 2002. Each year, over 4,000 coho were checked for marks in the observer program and in 2001, over 30,000 coho were checked for marks in the logbook program. Fishermen were not required to report mark rate information in their logbooks for coho in 2002.

For 2001, the ratio (unclipped to clipped) for the combined licence areas was 7:1 for the observer program and 6:1 for the logbook program (Table 16). For 2002, this ratio was 4:1 for the observer program (logbook mark-rates were not available). For both these years, Area B seine showed the highest proportion of unclipped coho. There was considerable variation in mark ratios among the different licence areas. This was particularly obvious for the logbook program for 2001 when the ratio (unclipped to clipped) ranged from 4:1 to 27:1 (Table 16). It should be noted that the majority of coho encountered were released, primarily at the waterline, and therefore the above observations of clip rates may not be entirely accurate.

Mark Recovery Rates for Chinook

Chinook mark rates are shown by licence area and gear type in Table 17. Only the 2002 data were available. The observers checked for marks over 7,000 chinook, with most of the sampling effort concentrated in two of the five licence areas (Area B seine and Area G troll). There were no mark-rate data from the logbook program that year. For 2002, the ratio (unclipped to clipped) for chinook was 13:1 for Seine Area B and 5:1 for Troll Area G. (Table 17).

MORTALITY EXPERIMENTS

Mortality experiments on coho and chinook provide estimates of the short-term mortality associated with their releases. These short-term mortality rates are a component of assessing the exploitation on coho and chinook by commercial salmon fisheries.

Starting in 1998, observers on board the fishing vessels conducted mortality experiments on coho captured incidentally during the South Coast commercial salmon fisheries. The aim was to assess the short-term mortality of coho after capture. Prompted by the coho mortality results in the first few years of this program, DFO included chinook into this study, starting in 2001. The aim was to assess the short-term mortality of chinook after capture and investigate whether the same methods that were used to decrease the short-term mortality of coho, could be used for chinook.

Similar methodology used for coho and chinook mortality experiments. Upon capture during commercial fisheries, coho and chinook were randomly selected from the catch and placed in revival tanks on board the fishing vessels. Observers assessed the initial

condition of each experimental fish at the time of placement into the tanks and assessed it again after a period of up to several hours in the revival tanks. Fish condition was subjectively assessed as one of five categories:

1. Vigorous and not bleeding,
2. Vigorous and some bleeding,
3. Lethargic and not bleeding,
4. Lethargic and bleeding,
5. Dead.

At the end of each test, all coho and chinook from the mortality experiments were released. Fish condition upon capture and at release from the revival tanks was compared, and the data were used to help quantify the short-term mortality of coho and chinook releases by gear type.

Coho

During 1998 to 2002, a total of 2,859 coho captured incidentally in the five licence areas were used in the mortality experiments (Table 18). Sample size each year ranged from a low of 39 fish in 1999, reflecting the low salmon catch that year (Table 2) to a high of 1,018 coho in 1998. Coho mortality data were summarized by year for the combined licence areas, as each area showed a similar mortality trend. Table 18 shows the proportions of coho in each condition category before and after the revival period. These data were also summarized over the 5-year period as each year showed similar "before" and "after" mortality trends.

For the combined licence areas and years, the majority of coho that were not vigorous at capture, revived when placed in the revival tanks. This was indicated by more than doubling of the overall fish numbers in the "Vigorous / Not bleeding" category from 1,003 to 2,029 coho or from 35% to 71% of the total (Table 18). A portion of coho died while in the tanks, raising the overall "Dead" component from 238 to 474 coho or from 8% to 17% of the total. Many of these coho were in very poor condition at the time of capture.

The actual mortality surrounding released coho is likely higher as some of the released fish die subsequently. The available data indicate that the type of fishing gear used, greatly affects the short-term mortality of captured coho. In particular, seine gear results in relatively low mortality rates (assuming proper sorting techniques) compared to gillnet gear where up to 40% of incidentally captured coho may die shortly after release.

Chinook

During 2001 to 2002, a total of 213 chinook captured incidentally during South Coast commercial fisheries were used in the mortality experiments (Table 19). Chinook mortality data were summarized for each year for the combined licence areas, as each area showed a similar mortality trend. Proportions of chinook in each condition category are shown before and after the revival period in Table 19.

For the combined licence areas and years, the majority of chinook that were not vigorous at capture, revived when placed in the revival tank. This was indicated by more than doubling of the overall fish numbers in the Vigorous / Not bleeding category (condition 1) from 59 to 130 chinook or from 28% to 61% of the total (Table 19). A portion of chinook died while in the tank, raising the overall Dead component (condition 5) from 13 to 37 chinook or from 6% to 17% of the total. Many of these chinook were in very poor condition at the time of capture.

The above short-term mortality experiments indicate that most coho and chinook placed in a revival tank can be released in a better condition than at the time of capture. However, these experiments do not allow for an accurate estimate of long-term mortality of these species because the long-term effects of capture and the ultimate fate of released fish remain unknown. More studies are needed to estimate accurately the long-term effects of commercial fishing gear on released salmon. The increase in awareness towards conservation, better fish handling methods, use of revival tanks on board the fishing vessels, have contributed to an overall increase in survival for coho and chinook released from commercial vessels.

CONDITION AT CAPTURE

Coho

Coho condition at capture is shown by licence area, gear type and year in Table 20. For the 1998 to 2002 period, a total of 11,364 coho were assessed for fish condition at capture, prior to immediate release, for all 5 gear types combined. Numbers of coho assessed each year ranged from a low of 197 fish in 1999, to a high of 4,130 coho in 2001.

Combined 5 year averages for all gear types show that nearly 3 in 4 that are released are in vigorous condition and that less than 1 in 10 are dead when released (Table 20a).

Coho Condition at Capture for 1998-2002 (Table 20a)

Fish Condition	Numbers	%
1-Vigorous / Not Bleeding	8,460	74
2-Vigorous / Bleeding	621	5
3-Lethargic / Not Bleeding	1,142	10
4-Lethargic / Bleeding	127	1
5-Dead	1,013	9
Total	11,364	100%

Combined 5 year averages for individual gear types show that seine and troll gear have a higher percentage of vigorous coho releases than do gillnets (Table 20b). Gillnets also have the largest percentage of coho released dead than any other gear type (Table 20b).

Summary of Coho Condition at Capture, 1998-2002 (Table 20b)

Licence Area and Gear Type	Vigorous	Lethargic	Dead
Seine Area B	84%	12%	4%
Troll Area G	82%	11%	7%
Troll Area H	72%	15%	13%
Gillnet Area E	57%	25%	18%
Gillnet Area D	44%	22%	34%

*data sets for a given Area and year with fewer than 10 coho were excluded.

There was considerable variation in coho mortality at capture among the different fisheries within a given Licence Area. For example in 1998, the highest coho mortality within Seine Area B was reported for the Johnstone Strait seine fishery on chum salmon. This may be attributed in part to the large catch-volume (over 300 fish/set) encountered during that fishery (1998 Summary Report, Fisheries and Oceans Canada 1999).

Fishers are becoming increasingly aware of better methods for handling incidentally caught salmon to reduce their mortality upon release. Specifically from 1998 to 2002, for all areas and gear types combined, the proportion of coho assessed as Vigorous at capture increased from 57% to 86%, while the proportion of coho assessed as Dead decreased from 10% to 8% (Table 20b).

Chinook

Chinook condition at capture is shown by licence area, gear type and year in Table 20. A total of 2,884 chinook were assessed for fish condition at capture, prior to immediate release, for all 5 gear types combined.

Combined yearly averages for all gear types show that almost 9 in 10 chinook that are released are in vigorous condition and that less than 1 in 20 are dead when released (Table 20c).

Chinook Condition at Capture for 1998-2002 (Table 20c)

Fish Condition	Numbers	%
1-Vigorous / Not Bleeding	2453	85%
2-Vigorous / Bleeding	168	6%
3-Lethargic / Not Bleeding	132	5%
4-Lethargic / Bleeding	7	0%
5-Dead	124	4%
Total	2,884	100%

Combined yearly averages for individual gear types show that seine and troll gear have a higher percentage of vigorous chinook releases than do gillnets (Table 20d). Gillnets also

have the largest percentage of chinook released dead than any other gear type (Table 20d).

Summary of Chinook Condition at Capture, 1998-2002 (Table 20d)

Licence Area and Gear Type	Vigorous	Lethargic	Dead
Seine Area B	92%	5%	3%
Troll Area G	92%	4%	4%
Troll Area H	74%	20%	6%
Gillnet Area E	NA	NA	NA
Gillnet Area D	57%	14%	30%

Experimental data for 2001-2002, for all areas and gear types combined, indicates that the proportion of chinook assessed as Vigorous at capture decreased from 80% to 79%, while the proportion of chinook assessed as Dead increased from 9% to 14%.

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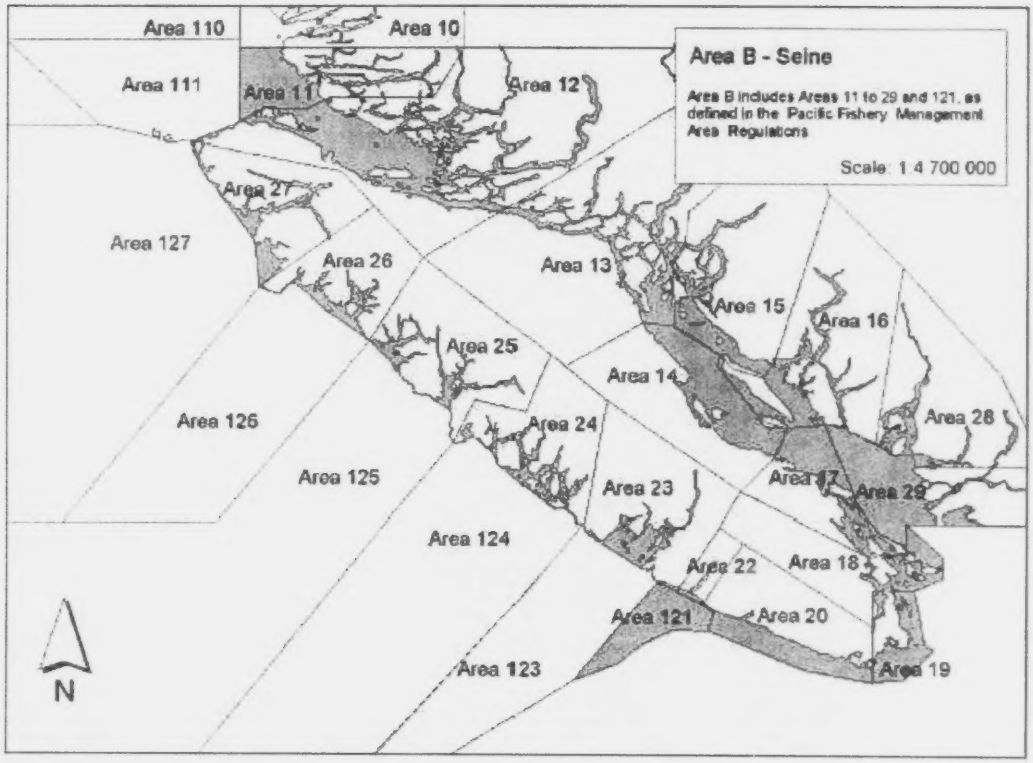
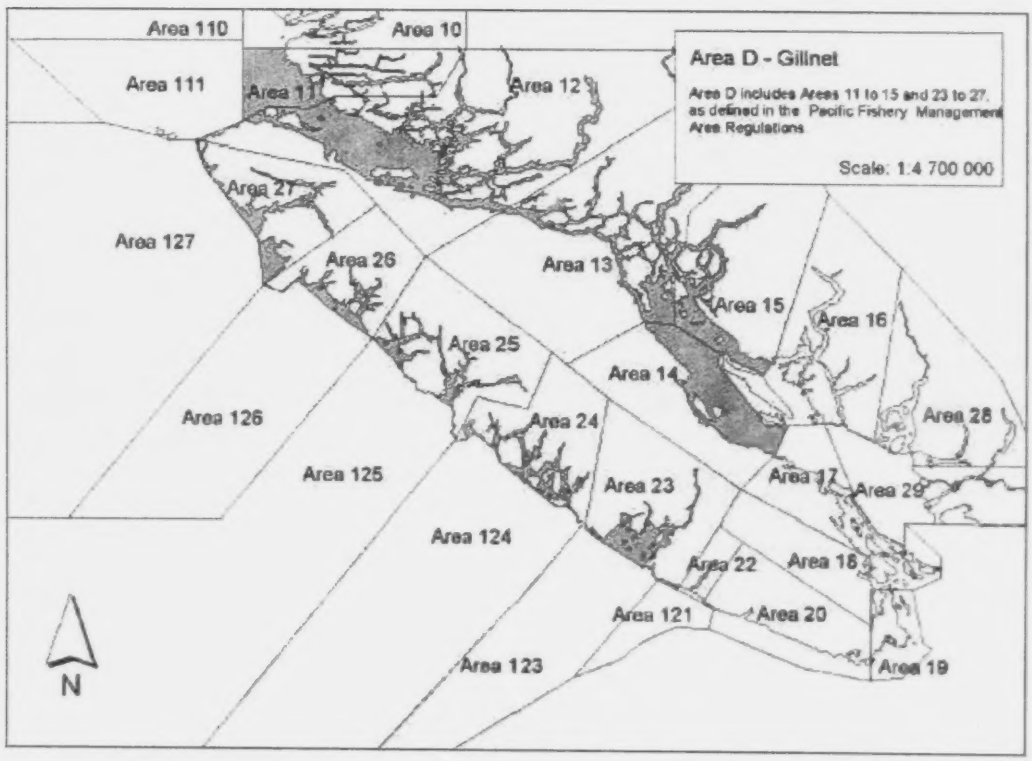
Figure 1. Commercial gear licence areas for Southern BC fisheries.





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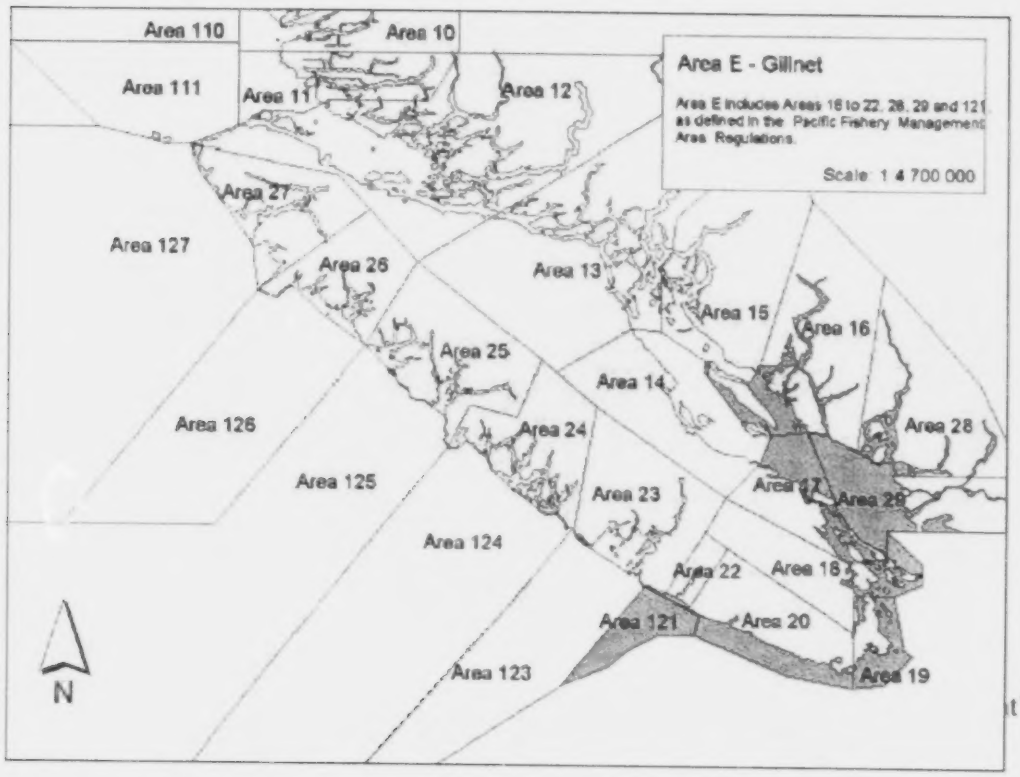

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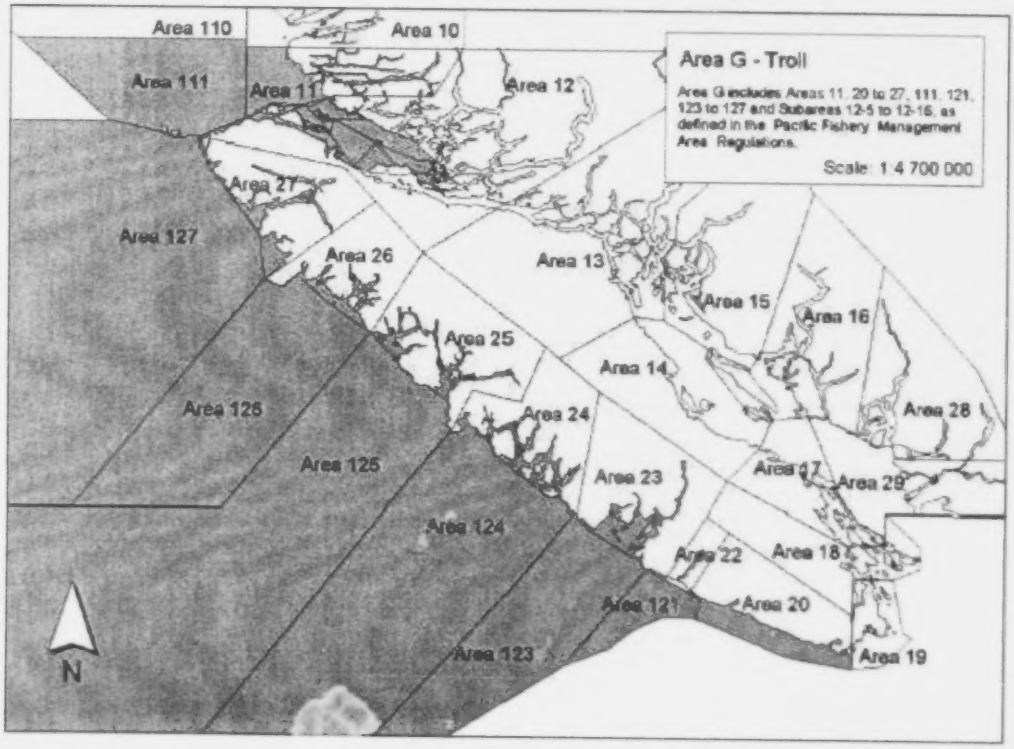

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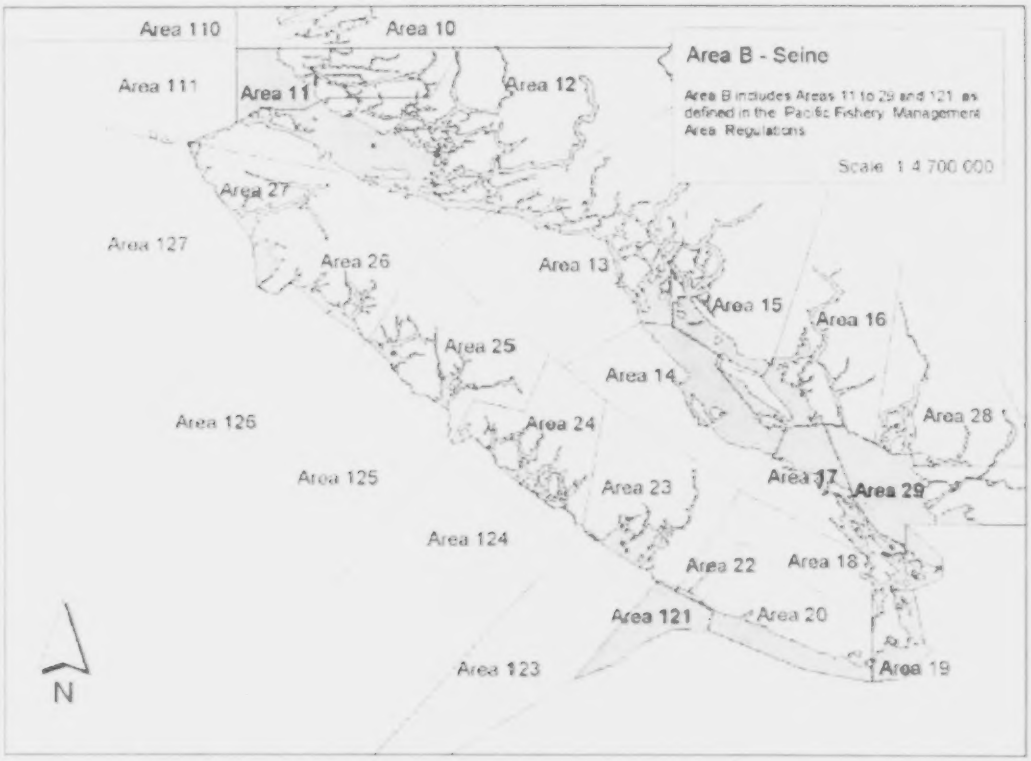

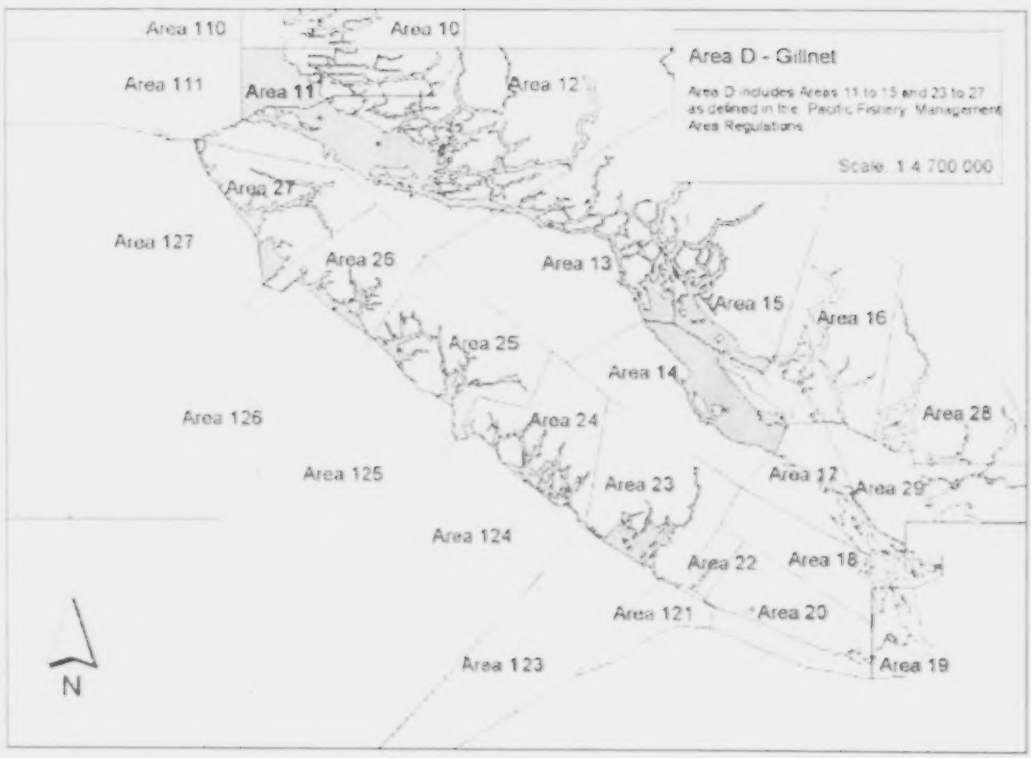

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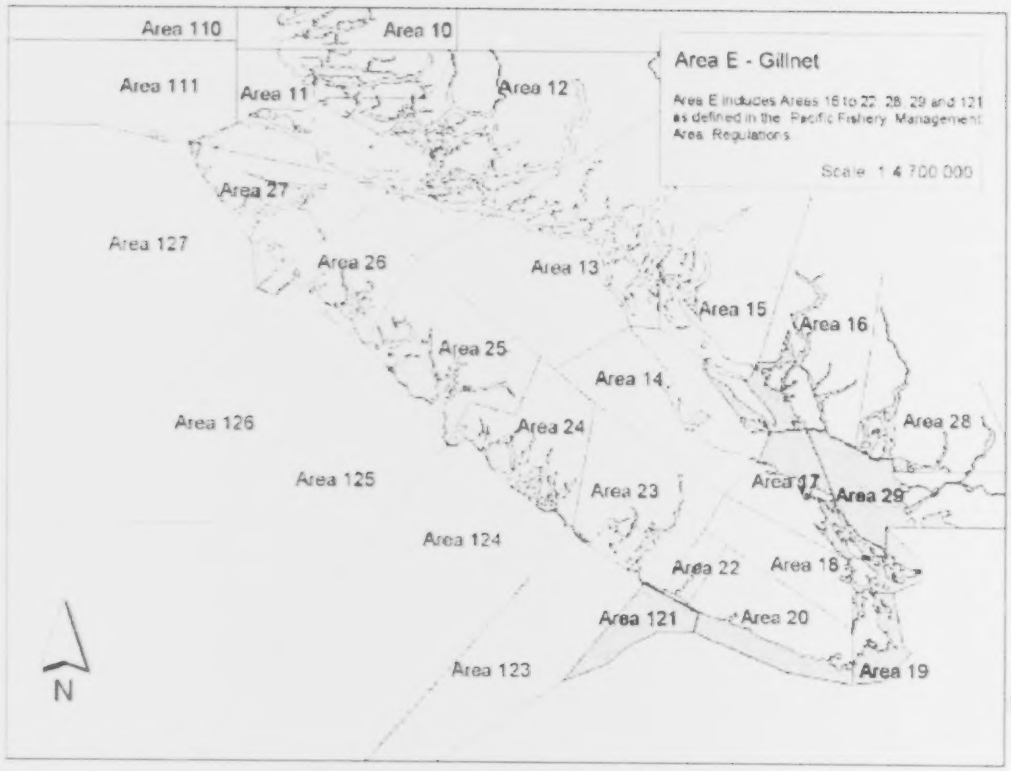

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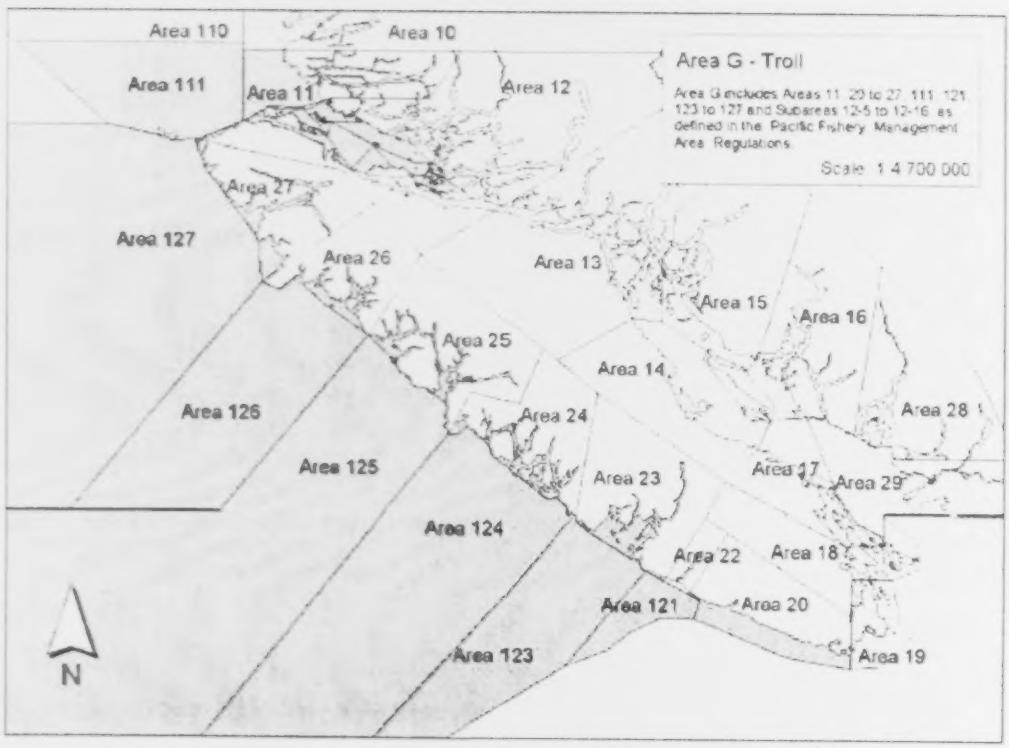

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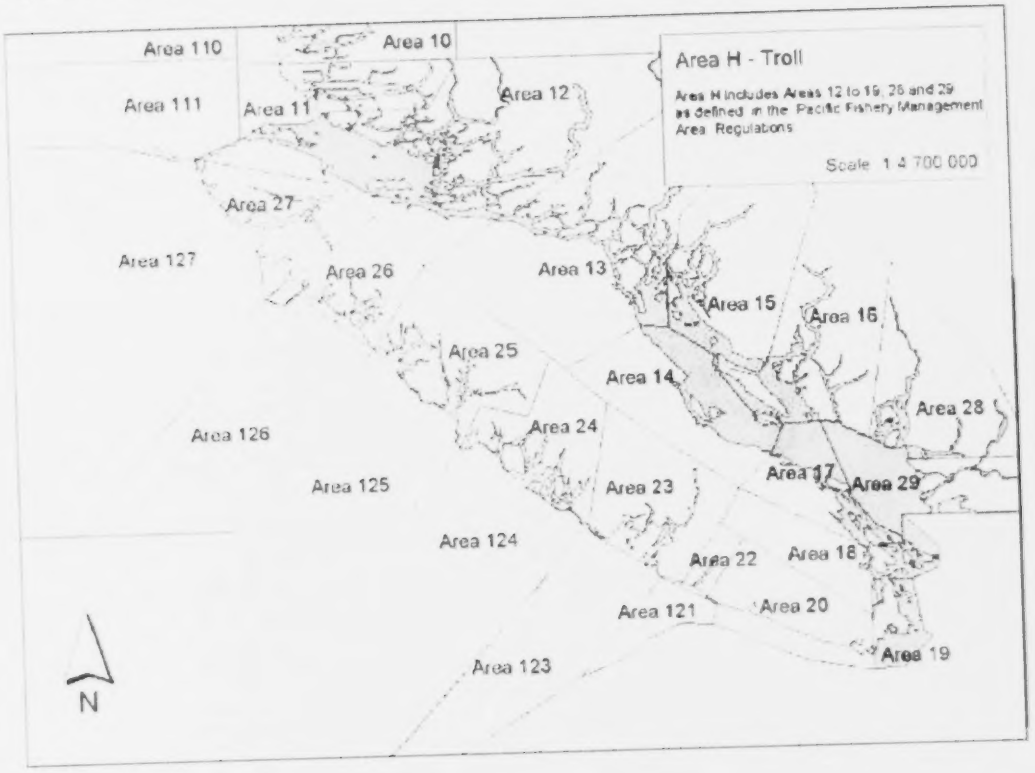

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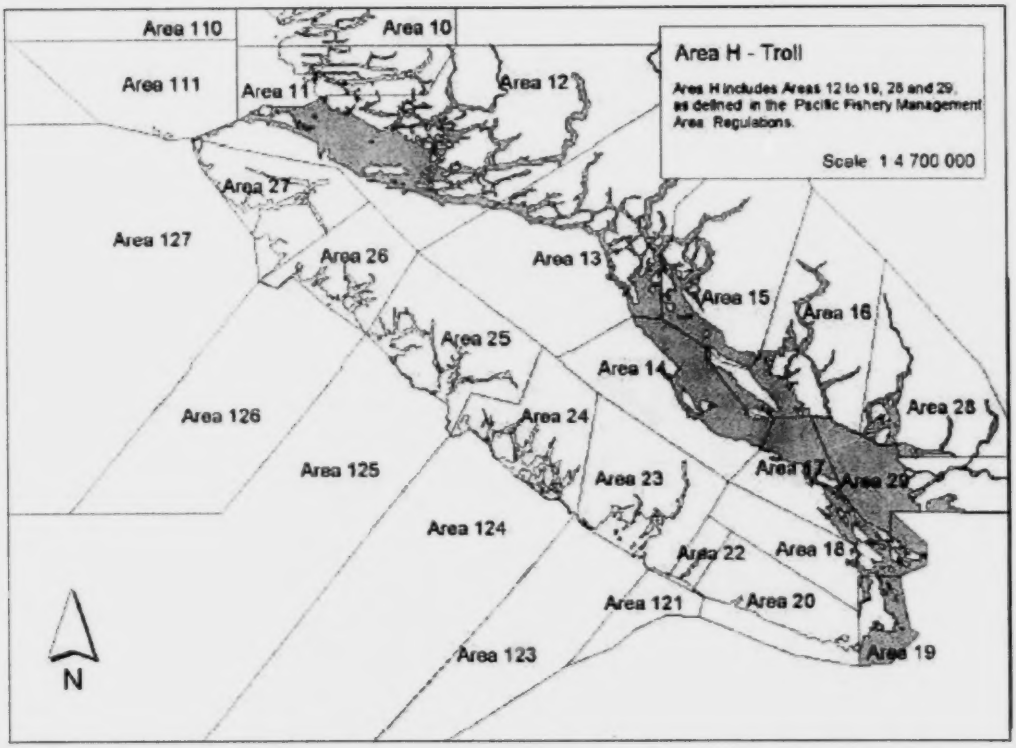

Table 1. Fisheries of concern and associated catch monitoring programs for South Coast commercial salmon fisheries, 2002.

FISHERIES OF CONCERN							
		Target	Rank of	2002 Catch Monitoring Programs			
Fishery	Area	Species	Concern *	Logbooks	MRP	Observers	Workbooks
Area G Troll	WCVI	Sockeye	69	X	X	X	X
Area B Seine	J. Strait	Sockeye	68	X	X	X	
Area H Troll	J. Strait	Sockeye	68	X	X	X	
Area E Gillnet	Fraser River	Sockeye	65	X	X	X	X
Area D Gillnet	J. Straits	Sockeye	64	X	X	X	X
Area B Seine	Area 20	Sockeye	61	X	X	X	X
Area H Troll	Area 18	Sockeye	54	X	X		
Area G Troll	WCVI	Chinook	50	X	X	X	X
Area E Gillnet	17/18/19	Chum	17	X		X	
Area B Seine	J. Strait	Chum	17	X	X	X	X
Area D Gillnet	J. Strait	Chum	17	X	X	X	X
Area H Troll	J. Strait	Chum	17	X	X	X	
Area H Troll	Mainland Inlets	Pinks	14	X			
Area D Gillnet	Mainland Inlets	Pinks	14	X		X	
Area G Troll	Barkley Sound	Sockeye	10	X	X		
Area B Seine	Barkley Sound	Sockeye	10	X	X		X
Area D Gillnet	Barkley Sound	Sockeye	10	X	X	X	X
Area H Troll	14/17/18/19	Chum	10	X	X		
Area E Gillnet	Fraser River	Chum	10	X	X		
Area D Gillnet	Nootka Sound	Chum	9	X		X	X
Area B Seine	14/18/19	Chum	9	X		X	
Area D Gillnet	Area 14	Chum	8	X		X	
Area B Seine	Nitinat	Chum	7	X		X	
Area E Gillnet	Nitinat	Chum	7	X		X	

* Rank of concern from Appendix 3.

Table 2. Logbook coverage by year and licence area for South Coast commercial salmon fisheries, 1998-2002.

LOGBOOK COVERAGE			
Year	Days Fished	Logbook Phone-ins	Logbook Coverage
Seine Area B			
1998	1,863	906	49%
1999**	No Commercial Seine Fishing		
2000	666	510	77%
2001	639	413	65%
2002	997	834	84%
			68% Ave.
Gillnet Area D			
1998	2,416	1,436	59%
1999**	1,909	1,800	94%
2000	2,133	1,864	87%
2001	2,426	1,979	82%
2002	4,287	3,716	87%
			82% Ave.
Gillnet Area E			
1998	3,280	955	29%
1999**	1,335	999	75%
2000	1,861	1,451	78%
2001	810	509	63%
2002	2,201	1,808	82%
			65% Ave.
Troll Area G			
1998	2,245	1,751	78%
1999**	1,609	1,247	78%
2000	1,762	1,510	86%
2001	2,560	2,225	87%
2002	5,047	4,624	92%
			84% Ave.
Troll Area H			
1998	1,054	929	88%
1999**	245	191	78%
2000	1,114	1,094	98%
2001	1,067	788	74%
2002	1,302	1,130	87%
			85% Ave.

* Data Sources: 1998 data from 1998 DFO Stock Assessment data for South Coast commercial salmon fisheries; 1999 to 2002 data from Annual Summary Reports (Fisheries and Oceans Canada 2000, 2001, 2002, 2003).

**1999 Logbook coverage was expanded based on mailed-in logbook reports. All other years were expanded based on phoned-in reports.

Table 3. Catch estimates from the logbook/phone-in program by year, species and licence area, for South Coast commercial salmon fisheries, 1998-2002.

Year*& Species **	Seine Area B	Gillnet Area D	Gillnet Area E	Troll Area G	Troll Area H	TOTAL
1998						
Sockeye ret.	500,323	221,774	305,049	222,912	128,596	1,378,654
Coho rel.	7,167	1,344	238	6,343	1,266	16,358
Pink ret.	48,447	13,589	25	18,811	19,056	99,928
Chum ret.	3,069,312	240,355	178,816	811	83,090	3,572,384
Chinook ret.	0	161	5,134	8,607	572	14,474
Chinook rel.	2,421	124	513	9,441	980	13,479
Stlhd ret.	0	57	27	0	0	84
Stlhd rel.	262	446	59	21	6	794
Total	**3,627,932**	**477,850**	**489,861**	**266,946**	**233,566**	**5,096,155**
1999						
Sockeye ret.		72,352	0	9,069	12,634	94,055
Coho rel.		840	243	3,297	51	4,431
Pink ret.		996	32	23	2,408	3,459
Chum ret.	Area B Seine	87,390	142,249	1,674	288	231,601
Chinook ret.	Fishery did not	144	37	56,653	232	57,066
Chinook rel.	occur in 1999	84	52	15,656	109	15,901
Stlhd ret.		127	0	0	0	127
Stlhd rel.		249	14	0	0	263
Total	**0**	**162,182**	**142,627**	**86,372**	**15,722**	**406,903**
2000						
Sockeye ret.	310,872	155,416	411,400	28,040	60,790	966,519
Sockeye rel.	14	9	22	10	6	61
Coho ret.	234	96	2	20	10	362
Coho rel.	5,794	2,736	153	7,536	833	17,052
Pink ret.	1,248,168	107,243	28	36,800	47,838	1,440,077
Pink rel.	20	212	0	4,566	1,212	6,010
Chum ret.	134,576	31,406	5,955	595	1,762	174,294
Chum rel.	53	22	56	29	4	165
Chinook ret.	36	195	4,172	24,086	556	29,046
Chinook rel.	2,141	168	129	12,777	482	15,697
Stlhd ret.	1	35	2	18	1	56
Stlhd rel.	109	329	20	12	3	473
Atlantic ret.	3,050	4,919	0	29	2	8,000
Atlantic rel.	215	874	0	3	8	1,100
Total	**1,705,284**	**303,659**	**421,940**	**114,520**	**113,507**	**2,658,910**
2001						
Sockeye ret.	87,429	142,266	8,477	39,856	60,937	338,965
Sockeye rel.	15,326	27	15	279	1,728	17,375
Coho ret.	1	30	3	14	0	48
Coho rel.	12,145	3,574	749	18,445	2,404	37,318
Pink ret.	900,834	17,792	0	21,656	90,766	1,031,049
Pink rel.	311	14	363	4,174	993	5,855
Chum ret.	292,702	125,916	120,870	415	8,538	548,441
Chum rel.	506	39	281	74	16	915
Chinook ret.	17	225	104	85,091	583	86,020
Chinook rel.	2,155	190	30	24,509	445	27,329
Stlhd ret.	0	6	0	0	0	6
Stlhd rel.	54	236	7	0	0	297
Atlantic ret.	0	19	0	1	3	23
Atlantic rel.	8	3	0	11	0	22
Total	**1,311,488**	**290,335**	**130,898**	**194,525**	**166,415**	**2,093,662**
2002						
Sockeye ret.	907,250	368,930	914,571	207,460	117,987	2,516,198
Sockeye rel.	14	17	840	114	248	1,232
Coho ret.	26	31	36	16	8	118
Coho rel.	9,542	5,664	1,656	28,254	1,154	46,270
Pink ret.	71,395	40,683	14	1,677	17,672	131,441
Pink rel.	108	784	0	1,693	2,105	4,690
Chum ret.	1,295,425	335,551	131,421	2,723	35,505	1,800,625
Chum rel.	136	999	1,003	213	46	2,397
Chinook ret.	2	607	4,274	146,041	610	151,534
Chinook rel.	2,492	426	198	21,624	379	25,118
Stlhd ret.	0	11	2	0	0	13
Stlhd rel.	304	500	29	28	0	862
Atlantic ret.	0	101	4	22	3	130
Atlantic rel.	6	67	4	157	3	237
Total	**2,286,701**	**754,372**	**1,054,054**	**410,020**	**175,720**	**4,680,866**

* Data sources: 1998 to 2002 (calendar year) data from reported Commercial Logbook (Phone-in) catches expanded by the Fishery Manager's estimate of gear count.

** ret. means retained or kept.
rel. means rel. back to the ocean (any condition)

Table 4. Observer coverage by year and licence area for South Coast commercial salmon fisheries, 1998-2001.

OBSERVER COVERAGE			
Year	Days Fished	Observer Boat-days Monitored	Observer Coverage
Seine Area B			
1998	1,863	132	7.1%
1999	No Commercial Seine Fishing		
2000	666	71	10.7%
2001	639	71	11.1%
			9.6% Ave.
Gillnet Area D			
1998	2,416	178	7.4%
1999	1,909	106	5.6%
2000	2,133	113	5.3%
2001	2,426	120	4.9%
			5.8% Ave.
Gillnet Area E			
1998	3,280	136	4.1%
1999	1,335	93	7.0%
2000	1,861	58	3.1%
2001	810	42	5.2%
			4.9% Ave.
Troll Area G			
1998	2,245	177	7.9%
1999	1,609	38	2.4%
2000	1,762	121	6.9%
2001	2,560	177	6.9%
			6.0% Ave.
Troll Area H			
1998	1,054	85	8.1%
1999	245	13	5.3%
2000	1,114	52	4.7%
2001	1,067	54	5.1%
			5.8% Ave.

* Data Sources: 1998 to 2001 data from Annual Summary Reports (Fisheries and Oceans Canada 1999, 2000, 2001, 2002).

Table 5. Observer coverage by year and licence area for South Coast commercial salmon fisheries, 2002 *, **.

OBSERVER COVERAGE				
Year	Days Fished	Days Fished in Monitored Fisheries	Observer Boat-days Monitored	Observer Coverage
Seine Area B				
2002	997	534	48	9.0%
Gillnet Area D				
2002	4,287	3,129	115	3.7%
Gillnet Area E				
2002	2,201	34	4	11.8%
Troll Area G				
2002	5,047	2,220	164	7.4%
Troll Area H				
2002	1,302	707	23	3.3%

* Data Sources: 2002 data from Annual Summary Reports (Fisheries and Oceans Canada, 2003).

**Select fisheries were only monitored in 2002 and indicated observer coverage levels are only for specific fisheries, not for all fisheries within a licence area as is 1998-2001.

Table 6. Observer catch estimated by year, species and licence area for monitored South Coast commercial salmon fisheries, 1998-2001*.

Year & Species **	Seine Area B	Gillnet Area D	Gillnet Area E	Troll Area G	Troll Area H	TOTAL
1998						
Sockeye	459,702	223,727	255,900	221,844	129,936	1,291,109
Coho rel.	9,027	2,423	274	8,635	2,024	22,383
Pink	41,061	14,575	0	20,489	21,378	97,503
Chum	3,299,712	259,263	172,199	1,107	88,253	3,820,534
Chinook rel.+ret.	4,980	459	6,625	13,257	2,904	28,225
Steelhead rel.+ ret.	275	1,110	181	0	0	1,566
Total	**3,814,757**	**501,557**	**435,179**	**265,332**	**244,495**	**5,261,320**
1999						
Sockeye		70,168	0	0	15,538	85,706
Coho rel.	No	1,411	837	2,743	153	5,144
Pink	Commercial	834	28	34	2,252	3,148
Chum	Seine	85,020	173,423	1,634	178	260,255
Chinook ret.	Fisheries	202	164	65,965	422	66,753
Chinook rel.	in 1999.	106	141	30,939	166	31,352
Steelhead rel.+ret.		1,105	42	0	0	1,147
Total	**0**	**158,846**	**174,635**	**101,315**	**18,709**	**453,505**
2000						
Sockeye	309,739	161,564	513,488	28,437	56,659	1,069,887
Coho rel.	7,305	5,373	284	7,654	1,014	21,630
Pink	1,748,626	144,352	40	29,577	47,581	1,970,176
Chum	110,882	27,556	5,235	181	3,225	147,079
Chinook ret.	22	186	6,029	20,437	554	27,228
Chinook rel.	3,317	435	187	16,683	264	870
Chinook enc.	3,339	621	6,216	37,120	818	48,114
Steelhead rel.+ret.	150	709	0	11	0	870
Atlantic ret.	1,866	6,164	0	29	0	8,059
Total	**2,185,246**	**346,960**	**531,479**	**140,129**	**110,115**	**3,293,913**
2001						
Sockeye	29,628	160,172	0	15,488	75,796	281,084
Coho rel.	16,619	5,747	1,629	23,070	2,962	50,027
Pink	785,794	15,460	0	26,091	101,132	928,477
Chum	348,864	108,095	138,489	305	5,588	601,341
Chinook ret.	11	388	33	46,593	789	47,814
Chinook rel.	1,966	373	214	22,684	611	25,848
Chinook enc.	1,977	761	247	69,277	1,400	73,662
Steelhead rel.+ret.	46	649	25	2	0	722
Atlantic ret.	0	23	0	0	0	23
Total	**1,184,905**	**291,668**	**140,637**	**203,510**	**188,278**	**2,008,998**

* Data sources: 1998 to 2001 data from Ann. Summ. Reps (Fisheries and Oceans Canada 1999, 2000, 2001, 2002).

** Catch status: Coho - all released,
Chinook - released or retained or both (encountered),
Steelhead - includes released & retained,
Atlantic salmon - all retained.

Table 7. Observer catch estimated by year, species and licence area for selectively monitored South Coast commercial salmon fisheries, 2002.

Year & Species	Seine Area B	Gillnet Area D	Gillnet Area E	Troll Area G	Troll Area H	TOTAL
2002						
Sockeye	255,188	0		121,219		376,407
Coho rel.	7,895	203		15,840		23,938
Pink	44,656	0	Excluded	1,243	Excluded	45,899
Chum	67,032	13,441	due to low	946	due to low	81,420
Chinook ret.	9	0	observer	11,590	observer	11,599
Chinook rel.	3,287	19	coverage	9,557	coverage	12,863
Chinook enc.	3,296	19		21,147		24,462
Steelhead rel.+ret.	33	0		0		33
Atlantic ret.	0	0		0		0
Total	378,100	13,663	0	160,401	0	552,164

Table 8. Comparison of observer and logbook coverage for South Coast commercial salmon fisheries, 1998-2001.

			Coverage		% Coverage		
Gear	Licence Area	Boat-Days Fished	Observer Boat-Days	Logbook Phone-ins	Observer Boat-Days	Logbook Phone-ins	
1998							
Seine	B	1,863	132	906	7%	49%	
Gillnet	D	2,416	178	1,436	7%	59%	
Gillnet	E	3,280	136	955	4%	29%	
Troll	G	2,245	177	1,751	8%	78%	
Troll	H	1,054	85	929	8%	88%	
All Area & Gear Types					7%	61%	Ave. of %
1999							
Seine	B	N/A	N/A	N/A	N/A	N/A	
Gillnet	D	1,909	106	1,800	6%	94%	
Gillnet	E	1,335	93	999	7%	75%	
Troll	G	1,609	38	1,247	2%	78%	
Troll	H	245	13	191	5%	78%	
All Area & Gear Types					5%	81%	Ave. of %
2000							
Seine	B	666	71	510	11%	77%	
Gillnet	D	2,133	113	1,864	5%	87%	
Gillnet	E	1,861	58	1,451	3%	78%	
Troll	G	1,762	121	1,510	7%	86%	
Troll	H	1,114	52	1,094	5%	98%	
All Area & Gear Types					6%	85%	Ave. of %
2001							
Seine	B	639	71	413	11%	65%	
Gillnet	D	2,426	120	1,979	5%	82%	
Gillnet	E	810	42	509	5%	63%	
Troll	G	2,560	177	2,225	7%	87%	
Troll	H	1,067	54	788	5%	74%	

* Data from Tables 2 and 4.

Table 9. Comparison of observer and logbook coverage for South Coast commercial salmon fisheries, 2002.

			Coverage		% Coverage		
Gear	Licence Area	Boat-Days Fished	Observer Boat-Days	Logbook Phone-ins	Observer Boat-Days	Logbook Phone-ins	
2002							
Seine	B	997	48	834	5%	84%	
Gillnet	D	4,287	115	3,716	3%	87%	
Gillnet	E	2,201	4	1,808	0%	82%	
Troll	G	5,047	164	4,624	3%	92%	
Troll	H	1,302	23	1,130	2%	87%	
All Area & Gear Types					3%	86%	Ave. of %

* Data from Tables 2 and 5.

Table 10. Comparison of observer and logbook catch estimates from South Coast salmon fisheries, 1998-2001.

	Observer	Logbook	Difference (Obs-Log)	% Difference ** (Obs-Log) / Obs
Seine Area B				
1998	3,814,757	3,627,932	186,825	5%
1999	No commercial seine fisheries.			
2000	2,185,246	1,705,284	479,962	22%
2001	1,184,905	1,311,488	126,583	11%
				13% Ave.
Gillnet Area D				
1998	501,557	477,850	23,707	5%
1999	158,846	162,182	3,336	2%
2000	346,960	303,659	43,301	12%
2001	291,668	290,335	1,333	0%
				5% Ave.
Gillnet Area E				
1998	435,179	489,861	54,682	13%
1999	174,635	142,627	32,008	18%
2000	531,479	421,940	109,539	21%
2001	140,637	130,898	9,739	7%
				15% Ave.
Troll Area G				
1998	265,332	266,946	1,614	1%
1999	101,315	86,372	14,943	15%
2000	140,129	114,520	25,609	18%
2001	203,510	194,525	8,985	4%
				10% Ave.
Troll Area H				
1998	244,495	233,566	10,929	4%
1999	18,709	15,722	2,987	16%
2000	110,115	113,507	3,392	3%
2001	188,278	166,415	21,863	12%
				9% Ave.
All Areas & Gears				
1998	5,261,320	5,096,155	165,165	3%
1999	453,505	406,903	46,602	10%
2000	3,313,929	2,658,910	655,019	20%
2001	2,008,998	2,093,661	84,663	4%
All Years	11,037,752	10,255,629	782,123	**9%** Ave.

* Catch data from Tables 3 and 6;

** Mean absolute difference

Table 11. Comparison of observer and logbook catch estimates for selectively monitored fisheries, South Coast commercial salmon fisheries, 2002.

	Observer	Logbook	Difference (Obs-Log)	% Difference * (Obs-Log) / Obs
Seine Area B	378,100	380,272	2,172	1%
Gillnet Area D	13,663	12,163	1,500	11%
Gillnet Area E	No significant observer coverage			
Troll Area G	160,401	144,305	16,096	10%
Troll Area H	No significant observer coverage			
All Areas & Gears	**552,164**	**536,740**	**19,768**	**7%**

*Absolute difference

Note: selected fishery observed portions do not include openings unattended by observers nor openings where the observer coverage is insufficient for estimation purposes.
Area E gillnet and Area H troll tables are excluded for this reason.

Table 12. Comparison of workbook and logbook catch estimates by vessel and species for South Coast commercial salmon fisheries, 2002.

Vessel	Gear	Effort (days)	Work-book	Log-book	% Wk/Lg	Work-book	Log-book	% Wk/Lg	Work-book	Log-book	% Wk/Lg	Work-book	Log-book	% Wk/Lg
			Sets			**Sockeye**			**Coho**			**Pink**		
A	GN	18	89	96	92.7%	844	830	101.7%	4	2	200.0%	302	292	103.4%
B	" "	5	20	21	95.2%	1,264	1,267	99.8%	3	4	75.0%	-	-	-
C	" "	20	116	110	105.5%	1,046	1,002	104.4%	5	6	83.3%	1	0	-
D	" "	7	35	36	97.2%	616	636	96.9%	-	-	-	174	173	100.6%
E	" "	9	42	40	105.0%	1,164	1,139	102.2%	5	4	125.0%	108	109	99.1%
F	" "	19	113	114	99.1%	-	-	-	9	5	180.0%	-	-	-
G	" "	34	230	227	101.3%	2,398	2,284	105.0%	27	28	96.4%	67	57	117.5%
H	" "	32	203	204	99.5%	1,884	1,908	98.7%	54	92	58.7%	202	164	123.2%
I	" "	20	122	123	99.2%	1,625	1,628	99.8%	16	17	94.1%	46	51	90.2%
J	SN	1	8	13	61.5%	2,935	2,935	100.0%	6	6	100.0%	2	2	100.0%
K	" "	10	101	101	100.0%	11,594	11,593	100.0%	196	239	82.0%	650	638	101.9%
L	TR	7	-	-	-	1,125	1,118	100.6%	232	210	110.5%	6	56	10.7%
	All Gear	182	1,079	1,085	**99.4%**	26,495	26,340	**100.6%**	557	613	**90.9%**	1,558	1,542	**101.0%**
	GN	164	970	971	99.9%	10,841	10,694	101.4%	123	158	77.8%	900	846	106.4%
	SN	11	109	114	95.6%	14,529	14,528	100.0%	202	245	82.4%	652	640	101.9%
	TR	7	-	-	-	1,125	1,118	100.6%	232	210	110.5%	6	56	10.7%
			Chum			**Chinook - Kept**			**Chinook - Released**			**Steelhead**		
A	GN	18	1,118	1,118	100.0%	3	4	75.0%	2	1	200.0%	-	-	-
B	" "	5	127	127	100.0%	23	23	100.0%	-	2	-	-	-	-
C	" "	20	3,078	2,727	112.9%	2	1	200.0%	2	2	100.0%	-	-	-
D	" "	7	16	13	123.1%	5	5	100.0%	-	-	-	-	-	-
E	" "	9	17	17	100.0%	5	4	125.0%	-	-	-	-	-	-
F	" "	19	3,933	3,925	100.2%	-	2	-	-	-	-	-	-	-
G	" "	34	5,457	5,595	97.5%	-	-	-	7	6	116.7%	7	6	116.7%
H	" "	32	3,097	3,096	100.0%	7	5	140.0%	5	8	62.5%	12	11	109.1%
I	" "	20	1,223	1,234	99.1%	-	-	-	-	-	-	-	13	-
J	SN	1	1	0	-	1	-	-	49	55	89.1%	-	-	-
K	" "	10	15,301	15,166	100.9%	1	1	100.0%	50	49	102.0%	9	10	90.0%
L	TR	7	24	21	114.3%	-	-	-	81	70	115.7%	-	-	-
	All Gear	182	33,392	33,039	**101.1%**	47	45	**104.4%**	196	193	**101.6%**	-	40	-
	GN	164	18,066	17,852	101.2%	45	44	102.3%	16	19	84.2%	-	30	-
	SN	11	15,302	15,166	100.9%	2	1	200.0%	99	104	95.2%	-	10	-
	TR	7	24	21	114.3%	-	-	-	81	70	115.7%	-	-	-

Table 13. Comparison of workbook, logbook/phone-in and observer catch estimates by fishery and species for South Coast commercial salmon fisheries, 2002*.

Fishery	Work-book	Log-book	Obser-ver	Work-book	Log-book	Obser-ver	Work-book	Log-book	Obser-ver	Work-book	Log-book	Obser-ver
	Sockeye			**Coho**			**Pink**			**Chum**		
All	92.6%	100%	90.4%	133.3%	100%	148.5%	55.6%	100%	88.2%	98.6%	100%	124.0%
Gillnet	70.8%	100%	99.4%	72.0%	100%	115.9%	86.1%	100%	94.7%	68.7%	100%	100.6%
Seine	100.7%	100%	87.0%	141.3%	100%	164.2%	201.6%	100%	44.0%	119.0%	100%	130.6%
Troll	102.9%	100%	107.6%	260.7%	100%	128.6%	512.1%	100%	12.0%	200.0%	100%	42.8%
Fraser SK	82.9%	100%	87.8%	123.2%	100%	129.0%	108.9%	100%	89.8%	101.1%	100%	61.7%
Barkley SK	104.1%	100%	111.1%	57.8%	100%	67.1%	98.0%	100%	100.0%	90.1%	100%	96.2%
Johnstone CM	99.0%	100%	99.0%	199.5%	100%	249.5%	155.0%	100%	31.0%	82.4%	100%	152.6%
M.V.I CM	-	-	-	196.0%	100%	166.7%	-	-	-	163.2%	100%	120.9%
Nitinat CM	99.0%	100%	-	352.2%	100%	-	99.0%	100%	-	75.3%	100%	-
Nootka CM	97.1%	100%	97.1%	60.5%	100%	139.0%	-	-	-	60.4%	100%	108.4%
Fraser CM	97.1%	100%	-	48.5%	100%	-	-	-	-	43.4%	100%	-
	Chinook - Kept			**Chinook - Released**			**Steelhead**					
All	213.4%	100%	221.1%	136.8%	100%	177.5%	166.7%	100%	168.9%			
Gillnet	203.8%	100%	151.4%	50.9%	100%	114.4%	160.4%	100%	180.3%			
Seine	150.0%	-	114.0%	132.9%	100%	185.3%	342.5%	100%	135.7%			
Troll	95.2%	100%	95.2%	151.0%	100%	171.1%	-	-	-			
Fraser SK	175.2%	100%	57.0%	156.2%	100%	181.4%	185.7%	100%	124.7%			
Barkley SK	929.4%	100%	777.8%	18.5%	100%	91.7%	140.6%	100%	194.9%			
Johnstone CM	52.0%	100%	93.5%	25.0%	100%	307.7%	230.6%	100%	278.3%			
M.V.I CM	91.7%	100%	90.9%	85.7%	100%	82.6%	98.0%	100%	98.0%			
Nitinat CM	-	-	-	88.5%	100%	-	97.1%	100%	-			
Nootka CM	33.0%	-	-	43.3%	100%	107.2%	421.1%	100%	88.5%			
Fraser CM	1000.0%	100%	-	85.5%	100%	-	91.7%	100%	-			

* All workbook and observer catches were compared to logbook/phone-in catch estimates, which were accepted as 100% of the reported value.

Table 14. Catch sampling coverage for the Mark Recovery Program in Area G commercial troll fisheries, 2002-2003.*

Month / Yr	Statistical Areas Fished	Total Allowable Catch (TAC)	Total Catch	Sampled Catch	% Sampling Coverage	
Oct-2002	123,126	10,000	11,917	4,979	42%	
Nov-2002	23,123,127	1,000	322	179	56%	
Dec-2002	23,27,123	1,000	449	251	56%	
Jan-2003	23,123	1,500	1,922	1,177	61%	
Feb-2003	23,123	1,500	1,324	755	57%	
Mar-2003	23,27,123-127	2,500	2,417	934	39%	
Total		17,500	18,351	8,275	45%	Ave.

(Demko and Beaith, 2002)

Table 15. Marked and unmarked chinook components in Area G commercial troll fisheries from the Mark Recovery Program, 2002-2003.*

Month / Yr.	Sampled Catch	Unclipped	Clipped	No CWT	CWT
Oct-2002	4,979	79 %	21 %	91 %	9 %
Nov-2002	179	59 %	41 %	91 %	9 %
Dec-2002	251	63 %	38 %	87 %	13 %
Jan-2003	1,177	65 %	35 %	88 %	12 %
Feb-2003	755	65 %	35 %	89 %	11 %
Mar-2003	934	70 %	30 %	92 %	8 %
Total	8,275	67 %	33 %	90 %	10 %

(Demko and Beaith, 2002)

Table 16. Coho mark-rates by gear and licence area in South Coast commercial salmon fisheries, 2001 and 2002*.

	Licence	Observer			Logbook		
Gear	Area	Unclipped	Clipped	Ratio (Uncl/Cl)	Unclipped	Clipped	Ratio (Uncl/Cl)
2001							
Seine	B	1,620	115	14 :1	6,805	254	27 :1
Gillnet	D	347	50	7 :1	2,919	233	13 :1
Gillnet	E	54	13	4 :1	469	72	7 :1
Troll	G	1,479	318	5 :1	14,214	3,434	4 :1
Troll	H	144	23	6 :1	2,139	157	14 :1
All Gear & Areas		3,644	519	7 :1	26,546	4,150	6 :1
2002							
Seine	B	1,220	187	7 :1			
Gillnet	D	120	21	6 :1			No
Gillnet	E	4	0	- Too few surveyed			Logbook
Troll	G	1,919	631	3 :1			Data
Troll	H	16	2	- Too few surveyed			
All Gear & Areas		3,279	841	4 :1			

* Data from 2001 and 2002 Annual Summary Reports (Fisheries and Oceans Canada 2002, 2003).

Table 17. Chinook mark-rates by gear and licence area in South Coast commercial salmon fisheries, 2002*.

Gear	Licence Area	Observer			Logbook		
		Unclipped	Clipped	Ratio (Uncl/Cl)	Unclipped	Clipped	Ratio (Uncl/Cl)
2002							
Seine	B	604	45	13 :1			
Gillnet	D	15	1	- Too few surveyed			
Gillnet	E	-	-	- No survey			
Troll	G	5,573	1,032	5 :1			
Troll	H	13	0	- Too few surveyed			
All Gear & Areas		6,205	1,078	6 :1			

* Data from 2002 Annual Summary Report (Fisheries and Oceans Canada 2003).

Table 18. Coho conditions before after release from revival tanks for combined gear types in South Coast commercial salmon fisheries 1998-2002*.

Coho **	1998				1999				2000			
	#s		%		#s		%		#s		%	
Cond'n	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.
1	368	734	36%	72%	11	26	28%	67%	200	390	38%	74%
2	84	32	8%	3%	2	0	5%	0%	86	33	16%	6%
3	407	82	40%	8%	16	4	41%	10%	158	22	30%	4%
4	75	11	7%	1%	3	0	8%	0%	35	0	7%	0%
5	84	159	8%	16%	7	9	18%	23%	48	82	9%	16%
Total		1,018	100%			39	100%			527	100%	

Coho **	2001				2002				All Years			
	#s		%		#s		%		#s		%	
Cond'n	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.
1	316	660	33%	70%	108	219	33%	67%	1,003	2,029	35%	71%
2	77	25	8%	3%	20	6	6%	2%	269	96	9%	3%
3	407	91	43%	10%	159	44	48%	13%	1,147	243	40%	8%
4	66	2	7%	0%	23	4	7%	1%	202	17	7%	1%
5	81	169	9%	18%	18	55	5%	17%	238	474	8%	17%
Total		947	100%			328	100%			2,859	100%	

* Data from 1998 to 2002 Annual Reports
(Fisheries and Oceans Canada 1999, 2000, 2001, 2002, 2003).

** Conditions Codes:
1 - Vigorous / Not bleeding
2 - Vigorous / Some bleeding
3 - Lethargic / Not bleeding
4 - Lethargic / Bleeding
5 - Dead (not moving or ventilating)

Note: not all coho caught by commercial fisheries were included in this experiment.

Table 19. Chinook conditions before after release from revival tanks for combined gear types in South Coast commercial salmon fisheries 2001-2002*.

Chin **	1998				1999				2000			
	#s		%		#s		%		#s		%	
Cond'n	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.
1 2 3 4 5	No Data				No Data				No Data			
Total												

Chin **	2001				2002				All Years			
	#s		%		#s		%		#s		%	
Cond'n	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.
1	39	77	29%	58%	20	53	25%	66%	59	130	28%	61%
2	14	0	11%	0%	5	3	6%	4%	19	3	9%	1%
3	55	25	41%	19%	48	18	60%	23%	103	43	48%	20%
4	16	0	12%	0%	3	0	4%	0%	19	0	9%	0%
5	9	31	7%	23%	4	6	5%	8%	13	37	6%	17%
Total		133	100%			80	100%			213	100%	

* Data from 2001-2002 Annual Reports (Fisheries and Oceans Canada 2002, 2003).

** Conditions Codes:
1 - Vigorous / Not bleeding
2 - Vigorous / Bleeding
3 - Lethargic / Not bleeding
4 - Lethargic / Bleeding
5 - Dead (not moving or ventilating)

Note: not all chinook caught by commercial fisheries were included in this experiment.

Table 20. Coho and chinook condition at capture by gear type in South Coast commercial salmon fisheries, 1998-2002. Data from the commercial observer program.

Licence Area & Year	COHO Condition & [Code] Vigorous [1&2]	Lethargic [3&4]	Dead [5]	(Sample Size)	CHINOOK Condition & [Code] Vigorous [1&2]	Lethargic [3&4]	Dead [5]	(Sample Size)
Seine Area B								
1998	60%	35%	5%	(902)	-	-	-	-
1999	-	-	-	-	-	-	-	-
2000	94%	4%	2%	(792)	-	-	-	-
2001	94%	6%	2%	(1,896)	95%	3%	1%	(238)
2002	86%	8%	6%	(1,464)	89%	7%	4%	(652)
Ave. of %	**84%**	**13%**	**4%**		**92%**	**5%**	**3%**	
Gillnet Area D								
1998	29%	31%	40%	(206)	-	-	-	-
1999	32%	46%	22%	(87)	-	-	-	-
2000	41%	10%	49%	(285)	-	-	-	-
2001	60%	8%	32%	(360)	59%	18%	23%	(22)
2002	57%	15%	29%	(140)	55%	9%	36%	(11)
Ave. of %	**44%**	**22%**	**34%**		**57%**	**14%**	**30%**	
Gillnet Area E								
1998	35%	45%	19%	(31)	-	-	-	-
1999	62%	22%	16%	(45)	-	-	-	-
2000	-	-	-	(7)	-	-	-	-
2001	74%	6%	20%	(65)	-	-	-	(3)
2002	-	-	-	(3)	-	-	-	(0)
Ave. of %	**57%**	**24%**	**18%**					
Troll Area G								
1998	65%	28%	7%	(406)	-	-	-	-
1999	89%	10%	2%	(60)	-	-	-	-
2000	88%	4%	9%	(640)	-	-	-	-
2001	80%	12%	8%	(1,653)	92%	3%	5%	(1,247)
2002	89%	4%	8%	(1,964)	92%	4%	3%	(668)
Ave. of %	**82%**	**12%**	**7%**		**92%**	**4%**	**4%**	
Troll Area H								
1998	59%	28%	14%	(136)	-	-	-	-
1999	-	-	-	(5)	-	-	-	-
2000	85%	0%	15%	(40)	-	-	-	-
2001	81%	12%	7%	(156)	74%	20%	6%	(35)
2002	62%	24%	14%	(21)				(8)
Ave. of %	**72%**	**16%**	**13%**		**74%**	**20%**	**6%**	
All Areas & Gear								
1998	57%	33%	10%	(1,681)	-	-		-
1999	57%	29%	14%	(197)	-	-		-
2000	82%	5%	13%	(1,764)	-	-		-
2001	83%	9%	8%	(4,130)	80%	11%	9%	(1,545)
2002	86%	5%	8%	(3,592)	79%	7%	14%	(1,339)

Note: not all chinook and coho estimated through the commercial observer program were assessed for condition types.

Appendix 1. Salmon stocks of concern in Southern BC commercial salmon fisheries*.

Species	Stock / Management Unit (MU)	Severity of Conservation Concern	Fishing Areas of Concern *				
			GST	JDF	WCVI	Fraser	JST
Chinook	Lower Fraser - early springs	High	Y	Y	Y	Y	
Coho	Thompson	High	Y	Y	Y	Y	Y
Pink	CC Mainland Inlets	High					Y
Sockeye	Fraser - Cultus	High	Y	Y	Y	Y	Y
Sockeye	Strait of Georgia - Sakinaw	High	Y				Y
Sockeye	Fraser - fall	High	Y	Y	Y	Y	Y
Chinook	Upper Fraser - Earliest timed springs (mostly 4	Medium	Y	Y	Y	Y	
Chinook	Lower Fraser - summers	Medium	Y	Y	Y	Y	Y
Chinook	WCVI	Medium			Y		
Chinook	Strait of Georgia	Medium	Y	Y	Y		Y
Chum	Johnstone Strait and Georgia Basin	Medium	Y	Y		Y	Y
Chum	WCVI	Medium			Y		
Coho	Strait of Georgia including lower Fraser	Medium	Y	Y	Y	Y	Y
Coho	CC	Medium					Y
Sockeye	Fraser - Early Stuart	Medium	Y	Y	Y	Y	Y
Sockeye	Fraser - early summer	Medium	Y	Y	Y	Y	Y
Chinook	Upper Fraser & Thompson - springs (mostly 5	Low	Y	Y	Y	Y	Y
Chinook	Upper Fraser - summers	Low	Y	Y	Y	Y	Y
Chinook	Lower Fraser - lates	Low	Y	Y	Y	Y	
Chinook	Thompson - late summers (41)	Low	Y	Y	Y	Y	Y
Coho	WCVI	Low			Y		
Pink	Fraser	Low	Y	Y	Y	Y	Y
Sockeye	WCVI	Low			Y		
Sockeye	Fraser - summers	Low	Y	Y	Y	Y	Y

* From Internal DFO Document (W. Shaw 2002).
For details, see Appendix 2.

Appendix 1. Salmon stocks of concern in Southern BC commercial salmon fisheries*.

Species	Stock / Management Unit (MU)	Severity of Conservation Concern	Fishing Areas of Concern *				
			GST	JDF	WCVI	Fraser	JST
Chinook	Lower Fraser - early springs	High	Y	Y	Y	Y	
Coho	Thompson	High	Y	Y	Y	Y	Y
Pink	CC Mainland Inlets	High					Y
Sockeye	Fraser - Cultus	High	Y	Y	Y	Y	Y
Sockeye	Strait of Georgia - Sakinaw	High	Y				Y
Sockeye	Fraser - fall	High	Y	Y	Y	Y	Y
Chinook	Upper Fraser - Earliest timed springs (mostly 4	Medium	Y	Y	Y	Y	
Chinook	Lower Fraser - summers	Medium	Y	Y	Y	Y	Y
Chinook	WCVI	Medium			Y		
Chinook	Strait of Georgia	Medium	Y	Y	Y		Y
Chum	Johnstone Strait and Georgia Basin	Medium	Y	Y		Y	Y
Chum	WCVI	Medium			Y		
Coho	Strait of Georgia including lower Fraser	Medium	Y	Y	Y	Y	Y
Coho	CC	Medium					Y
Sockeye	Fraser - Early Stuart	Medium	Y	Y	Y	Y	Y
Sockeye	Fraser - early summer	Medium	Y	Y	Y	Y	Y
Chinook	Upper Fraser & Thompson - springs (mostly 5	Low	Y	Y	Y	Y	Y
Chinook	Upper Fraser - summers	Low	Y	Y	Y	Y	Y
Chinook	Lower Fraser - lates	Low	Y	Y	Y	Y	
Chinook	Thompson - late summers (41)	Low	Y	Y	Y	Y	Y
Coho	WCVI	Low			Y		
Pink	Fraser	Low	Y	Y	Y	Y	Y
Sockeye	WCVI	Low			Y		
Sockeye	Fraser - summers	Low	Y	Y	Y	Y	Y

* From Internal DFO Document (W. Shaw 2002).
For details, see Appendix 2.

Appendix 2. Ranking criteria for fisheries of concern in South Coast commercial salmon fisheries, 2002*.

JOHNSTONE STRAIT COMMERCIAL SALMON FISHERIES			Impact on stocks of concern by fishery by area - Johnstone Strait								
			Area B	Area B	Area D	Area D	Area H	Area H	Area H	Area D	Area B
		Conser-	Seine	Seine	Gillnet	Gillnet	Troll	Troll	Troll	Gillnet	Seine
		vation	J. Strait	J. Strait	J. Strait	J. Strait	J. Strait	J. Strait	Mainland Inlets		
Species	Stocks of Concern	Concern	Sockeye	Chum	Sockeye	Chum	Sockeye	Chum	Pink	Pink	Pink
chinook	Yukon	H									
chinook	Lower Fraser - early springs	H									
chum	Yukon	H									
chum	NC	H									
coho	Thompson	H	M	M	M	M	M	M			
pink	CC Mainland Inlets	H	M		M		M		H	H	H
sockeye	Fraser - Cultus	H	H		H		H				
sockeye	Strait of Georgia - Galiinaw	H	H		H		H				
sockeye	CC	H									
sockeye	Fraser -- fall	H	H		H		H				
sockeye	Skeena wild	H									
chinook	Upper Fraser - earliest timed springs (mostly 42)	M									
chinook	Lower Fraser - Summers	M	L		L		L				
chinook	WCVI	M									
chinook	Strait of Georgia	M	L		L	L	L	L	L	L	L
chum	Johnstone Strait and Georgia Basin	M		H		H		H	L	L	L
chum	WCVI	M									
chum	QCI	M									
coho	Strait of Georgia including lower Fraser	M	M	M	M	M	M		L	L	L
coho	CC	M	M	M	M	M	M	M	M	M	M
coho	QCI	M									
coho	NC	M									
sockeye	Fraser -- Early Stuart	M	H		M		H				
sockeye	Fraser -- Early Summer	M	H		H		H				
sockeye	Stikine	M									
sockeye	Babine Lake enhanced (BLDP) (Pinkut & Fulton)	M									
sockeye	Alsek	M									
chinook	Taku	L									
chinook	Upper Fraser & Thompson - springs (mostly 52)	L	L		L		L				
chinook	Upper Fraser--Summers	L	H		H		H				
chinook	Lower Fraser - lates	L									
chinook	Stikine	L									
chinook	Alsek	L									
chinook	Nass	L									
chinook	NC	L									
chinook	Thompson - late summers (41)	L	L		L		L				
chinook	CC	L									
chum	CC	L									
coho	WCVI	L									
coho	Stikine	L									
coho	Alsek	L									
coho	Taku	L									
pink	Fraser	L	H		H		H				
pink	CC	L									
pink	NC	L									
pink	QCI	L									
sockeye	Taku	L									
sockeye	Nass	L									
sockeye	WCVI	L									
sockeye	Fraser -- summer	L	H		H		H				

Rank Total	Conservation Concern	Fishery Impact									
9	H	H	3	0	3	0	3	0	1	1	1
6	H	M	2	1	2	1	2	1	0	0	0
3	H	L	0	0	0	0	0	0	0	0	0
6	M	H	2	1	1	1	2	1	0	0	0
2	M	M	2	2	3	2	2	2	1	1	1
1	M	L	2	1	2	1	2	1	3	3	3
3	L	H	3	0	3	0	3	0	0	0	0
2	L	M	0	0	0	0	0	0	0	0	0
1	L	L	2	0	2	0	2	0	0	0	0
9=H*H(3*3)		Tot. Impact	68	17	64	17	68	17	14	14	14
6=H*M(3*2)		of Concern									
3=H*L(3*1)											
2=M*L(2*1)											
1=L*L(1*1)											

* Shaded rows indicate stocks that are impacted by Southern BC commercial salmon fisheries

Appendix 2 cont'd.

STRAIT OF GEORGIA COMMERCIAL SALMON FISHERIES			Impact on stocks of concern by fishery by area - Strait of Georgia					
			Area B	Area B	Area H	Area H	Area E	Area D
		Conser-	Seine	Seine	Troll	Troll	Gillnet	Gillnet
Species	Stocks of Concern	vation Concern	16/18 Sockeye	14/18/19 Chum	18 Sockeye	14/17/18/19 Chum	17/18/19 Chum	14 Chum
chinook	Yukon	H						
chinook	Lower Fraser - early springs	H	L		L			
chum	Yukon	H						
chum	NC	H						
coho	Thompson	H	M		M			
pink	CC Mainland Inlets	H						
sockeye	Fraser - Cultus	H	H		H			
sockeye	Strait of Georgia - Sakinaw	H	H		H			
sockeye	CC	H						
sockeye	Fraser - Gill	H	H		H			
sockeye	Skeena wild	H						
chinook	Upper Fraser - earliest timed springs (mostly 4_2)	M	L		L			
chinook	Lower Fraser - Summers	M	H		L	L	L	
chinook	WCVI	M						
chinook	Strait of Georgia	M	L	L	L	L	L	
chum	Johnstone Strait and Georgia Basin	M		H		H	H	H
chum	WCVI	M						
chum	QCI	M						
coho	Strait of Georgia including lower Fraser	M	M	M	M	M	M	M
coho	CC	M						
coho	QCI	M						
coho	NC	M						
sockeye	Fraser - Early Stuart	M						
sockeye	Fraser - Early Summer	M						
sockeye	Stikine	M						
sockeye	Babine Lake enhanced (BLDP) (Pinkut & Fulton)	M						
sockeye	Alsek	M						
chinook	Taku	L						
chinook	Upper Fraser & Thompson - springs (mostly 5_2)	L	L		L		L	
chinook	Upper Fraser - Summers	L	H		H			
chinook	Lower Fraser - lates	L	H		H			
chinook	Stikine	L						
chinook	Alsek	L						
chinook	Nass	L						
chinook	NC	L						
chinook	Thompson - late summers (4_1)	L						
chinook	CC	L						
chum	CC	L						
coho	WCVI	L						
coho	Stikine	L						
coho	Alsek	L						
coho	Taku	L						
pink	Fraser	L	H		H		H	
pink	CC	L						
pink	NC	L						
pink	QCI	L						
sockeye	Taku	L						
sockeye	Nass	L						
sockeye	WCVI	L						
sockeye	Fraser - Summer	L	H		H		H	

Rank Total	Conservation Concern	Fishery Impact						
9	H	H	3	0	3	0	0	0
6	H	M	1	0	1	0	0	0
3	H	L	1	0	1	0	0	0
6	M	H	1	1	0	1	1	1
2	M	M	1	1	1	1	1	1
1	M	L	2	1	3	2	2	0
3	L	H	4	0	4	0	2	0
2	L	M	0	0	0	0	0	0
1	L	L	1	0	1	0	1	0
9=H*H(3*3)		Tot. Impact	59	9	54	10	17	8
6=H*M(3*2)		of Concern						
3=H*L(3*1)								
2=M*L(2*1)								
1=L*L(1*1)								

* Shaded rows indicate stocks that are impacted by Southern BC commercial salmon fisheries.

Appendix 2. Ranking criteria for fisheries of concern in South Coast commercial salmon fisheries, 2002*.

Species	JOHNSTONE STRAIT COMMERCIAL SALMON FISHERIES Stocks of Concern	Conservation Concern	Impact on stocks of concern by fishery by area - Johnstone Strait								
			Area 12 Troll (Mar-Aug)	Area 13 Troll (Mar-Aug)	Area 12 Seine (Aug-mid Sept)	Area 13 Seine (Aug-mid Sept)	Area 12 Troll (Sept-Oct)	Area 13 Troll (Sept-Oct)	Area 11 Troll (Aug-Sept)	Area 12 Seine (Aug-mid Sept)	Area 11 Troll (Sept-Oct)
			Combined Gear								
coho	Thompson	H	M	M	M	M	M	M			
pink	CC Mainland Inlets	H	M		M		M		H	H	H
sockeye	Fraser - Cultus	H	H		H		H				
sockeye	Strait of Georgia - Sakinaw	H	H		H		H				
sockeye	Fraser – fall	H	H		H		H				
chinook	Lower Fraser - Summers	M	L		L		L				
chinook	Strait of Georgia	M	L	L	L	L	L	L	L	L	L
chum	Johnstone Strait and Georgia Basin	M		H		H		H	L	L	L
coho	Strait of Georgia including lower Fraser	M	M	M	M	M	M	M	L	L	L
coho	CC	M	M	M	M	M	M	M	M	M	M
sockeye	Fraser – Early Stuart	M	H		M		H				
sockeye	Fraser – Early Summer	M	H		H		H				
chinook	Upper Fraser & Thompson – springs (mostly 52)	L	L		L		L				
chinook	Upper Fraser + Summers	L	H		H		H				
chinook	Thompson - late summers (41)	L	L		L		L				
pink	Fraser	L	H		H		H				
sockeye	Fraser – summer	L	H		H		H				

Rank	Status
Final	Original
H	H
M	M
L	L

Appendix 2 cont'd.

Species	STRAIT OF GEORGIA COMMERCIAL SALMON FISHERIES Stocks of Concern	Conservation Concern	Impact on stocks of concern by fishery by area - Strait of Georgia Area B Seine 13, 29 Sockeye	Area B Seine 14, 15, 19 Chum	Area B Troll 18 Sockeye	Area B Troll 14, 17, 18, 19 Chum	Area B Gillnet 17, 18, 19 Chum	Area B Gillnet 14 Chum
chinook	Lower Fraser - early springs	H	L		L			
coho	Thompson	H	M		M			
sockeye	Fraser - Cultus	H	H		H			
sockeye	Strait of Georgia - Sakinaw	H	H		H			
sockeye	Fraser – fall	H	H		H			
chinook	Upper Fraser – earliest timed springs (mostly 4	M	L		L			
chinook	Lower Fraser - Summers	M	H		L	L	L	
chinook	Strait of Georgia	M	L	L	L	L	L	
chum	Johnstone Strait and Georgia Basin	M		H		H	H	H
coho	Strait of Georgia including lower Fraser	M	M	M	M	M	M	M
sockeye	Fraser – Early Stuart	M						
sockeye	Fraser – Early Summer	M						
chinook	Upper Fraser & Thompson - springs (mostly 5_2)	L	L		L		L	
chinook	Upper Fraser - Summers	L	H		H			
chinook	Lower Fraser - late	L	H		H			
chinook	Thompson - late summers (4.1)	L						
pink	Fraser	L	H		H		H	
sockeye	Fraser – summer	L	H		H		H	

Rank Total	Conservation Concern	Fishery Impact
	H	H
	M	M
	L	L
	H	H
	M	M
	L	L
	H	H
	M	M
	L	L

Appendix 2 cont'd.

FRASER RIVER COMMERCIAL SALMON FISHERIES		Impact on stocks of concern by fishery by area - Fraser R.			
Species	Stocks of Concern	Conser-vation Concern	Area B Seine Fraser R. Chum	Area E Gillnet Fraser R. Sockeye	Area E Gillnet Fraser R. Chum
chinook	Yukon	H			
chinook	Lower Fraser - early springs	H	L	H	
chum	Yukon	H			
chum	NC	H			
coho	Thompson	H	L		L
pink	CC Mainland Inlets	H			
sockeye	Fraser - Cultus	H	H	H	
sockeye	Strait of Georgia - Sakinaw	H			
sockeye	CC	H			
sockeye	Fraser - fall	H	H	H	
sockeye	Skeena wild	H			
chinook	Upper Fraser - earliest timed springs (mostly 4_2)	M	L	H	
chinook	Lower Fraser - Summers	M	L	H	
chinook	WCVI	M			
chinook	Strait of Georgia	M			
chum	Johnstone Strait and Georgia Basin	M	L		H
chum	WCVI	M			
chum	QCI	M			
coho	Strait of Georgia including lower Fraser	M	L		L
coho	CC	M			
coho	QCI	M			
coho	NC	M			
sockeye	Fraser - Early Stuart	M	L	H	
sockeye	Fraser - Early Summer	M	H	H	
sockeye	Stikine	M			
sockeye	Babine Lake enhanced (BLDP) (Pinkut & Fulton)	M			
sockeye	Alsek	M			
chinook	Taku	L			
chinook	Upper Fraser & Thompson - springs (mostly 5_2)	L		L	
chinook	Upper Fraser - Summers	L		H	
chinook	Lower Fraser - lates	L		H	
chinook	Stikine	L			
chinook	Alsek	L			
chinook	Nass	L			
chinook	NC	L			
chinook	Thompson - late summers (4_1)	L		L	
chinook	CC	L			
chum	CC	L			
coho	WCVI	L			
coho	Stikine	L			
coho	Alsek	L			
coho	Taku	L			
pink	Fraser	L		H	
pink	CC	L			
pink	NC	L			
pink	QCI	L			
sockeye	Taku	L			
sockeye	Nass	L			
sockeye	WCVI	L			
sockeye	Fraser - summer	L		H	

Rank Total	Conservation Concern	Fishery Impact			
9	H	H	2	3	0
6	H	M	0	0	0
3	H	L	2	0	1
6	M	H	1	4	1
2	M	M	0	0	0
1	M	L	5	0	1
3	L	H	0	4	0
2	L	M	0	0	0
1	L	L	0	2	0
		Tot. Impact of Concern	35	65	10

9=H*H(3*3)
6=H*M(3*2)
3=H*L(3*1)
2=M*L(2*1)
1=L*L(1*1)

* Shaded rows indicate stocks that are impacted by Southern BC commercial salmon fisheries.

Appendix 2 cont'd.

Impact on stocks of concern by fishery by area - Strait of Juan de Fuca

Species	STRAIT OF JUAN DE FUCA COMMERCIAL SALMON FISHERIES Stocks of Concern	Conser-vation Concern	Area B Seine Area 20 Sockeye
chinook	Yukon	H	
chinook	Lower Fraser - early springs	H	L
chum	Yukon	H	
chum	NC	H	
coho	Thompson	H	H
pink	CC Mainland Inlets	H	
sockeye	Fraser - Cultus	H	H
sockeye	Strait of Georgia - Sakinaw	H	
sockeye	CC	H	
sockeye	Fraser - fall	H	H
sockeye	Skeena wild	H	
chinook	Upper Fraser - earliest timed springs (mostly 4_2)	M	L
chinook	Lower Fraser - Summers	M	L
chinook	WCVI	M	
chinook	Strait of Georgia	M	L
chum	Johnstone Strait and Georgia Basin	M	
chum	WCVI	M	
chum	QCI	M	
coho	Strait of Georgia including lower Fraser	M	H
coho	CC	M	
coho	QCI	M	
coho	NC	M	
sockeye	Fraser – Early Stuart	M	H
sockeye	Fraser – Early Summer	M	H
sockeye	Stikine	M	
sockeye	Babine Lake enhanced (BLDP) (Pinkut & Fulton)	M	
sockeye	Alsek	M	
chinook	Taku	L	
chinook	Upper Fraser & Thompson - springs (mostly 5_2)	L	L
chinook	Upper Fraser - Summers	L	L
chinook	Lower Fraser - lates	L	L
chinook	Stikine	L	
chinook	Alsek	L	
chinook	Nass	L	
chinook	NC	L	
chinook	Thompson - late summers (4_1)	L	L
chinook	CC	L	
chum	CC	L	
coho	WCVI	L	
coho	Stikine	L	
coho	Alsek	L	
coho	Taku	L	
pink	Fraser	L	H
pink	CC	L	
pink	NC	L	
pink	QCI	L	
sockeye	Taku	L	
sockeye	Nass	L	
sockeye	WCVI	L	
sockeye	Fraser – summer	L	H

Rank Total	Conservation Concern	Fishery Impact	
9	H	H	3
6	H	M	0
3	H	L	1
6	M	H	3
2	M	M	0
1	M	L	3
3	L	H	2
2	L	M	0
1	L	L	4
		Tot. Impact of Concern	61

9=H*H(3*3)
6=H*M(3*2)
3=H*L(3*1)
2=M*L(2*1)
1=L*L(1*1)

* Shaded rows indicate stocks that are impacted by Southern BC commercial salmon fisheries.

Appendix 2 cont'd.

FRASER RIVER COMMERCIAL SALMON FISHERIES		Impact on stocks of concern by fishery by area - Fraser R.			
Species	Stocks of Concern	Conser-vation Concern	Area 6 Seine Fraser R. Chum	Area 7 Gillnet Fraser R. Sockeye	Area 8 Gillnet Fraser R. Chum
chinook	Yukon	H			
chinook	Lower Fraser - early springs	H	L	H	
chum	Yukon	H			
chum	NC	H			
coho	Thompson	H	L		L
pink	U.S. Mainland inlets	H			
sockeye	Fraser - Cultus	H	H	H	
sockeye	Strait of Georgia - Sakinaw	H			
sockeye	CC	H			
sockeye	Fraser – fall	H	H	H	
sockeye	Skeena wild	H			
chinook	Upper Fraser - earliest timed springs (mostly 4_1)	M	L	H	
chinook	Lower Fraser - Summers	M	L	H	
chinook	WCVI	M			
chinook	Strait of Georgia	M			
chum	Johnstone Strait and Georgia Basin	M	L		H
chum	WCVI	M			
chum	QCI	M			
coho	Strait of Georgia including lower Fraser	M	L		L
coho	CC	M			
coho	QCI	M			
coho	NC	M			
sockeye	Fraser – Early Stuart	M	L	H	
sockeye	Fraser – Early Summer	M	H	H	
sockeye	Stikine	M			
sockeye	Babine Lake enhanced (BLEP), Pinkut & Fulton	M			
sockeye	Mink	M			
chinook	Taku	L			
chinook	Upper Fraser & Thompson - springs (mostly 5_3)	L		L	
chinook	Upper Fraser - Summers	L		H	
chinook	Lower Fraser - lates	L		H	
chinook	Stikine	L			
chinook	Mink	L			
chinook	Nass	L			
chinook	NC	L			
chinook	Thompson - late summers (4_1)	L		L	
chinook	CC	L			
chum	CC	L			
coho	WCVI	L			
coho	Stikine	L			
coho	Mink	L			
coho	Taku	L			
pink	Fraser	L		H	
pink	CC	L			
pink	NC	L			
pink	QCI	L			
sockeye	Taku	L			
sockeye	Nass	L			
sockeye	WCVI	L			
sockeye	Fraser – summer	L		H	

Rank Total	Conservation Concern	Fishery Impact			
4	H	H	2	3	
3	H	M	2		1
2	H	L	2		
4	M	H	1	4	
3	M	M	1		2
2	M	L	1		1
1	L	H		4	
2	L	M			2
1	L	L			1
		Tot. Impact of Concern	14	65	10

* Shaded rows indicate stocks that are impacted by southern BC commercial salmon fisheries

Appendix 2 cont'd.

Impact on stocks of concern by fishery by area - Strait of Juan de Fuca

STRAIT OF JUAN DE FUCA COMMERCIAL SALMON FISHERIES		Conservation Concern	Area B Seine Area 20 Sockeye
Species	Stocks of Concern		
chinook	Yukon	H	
chinook	Lower Fraser - early springs	H	L
chum	Yukon	H	
chum	NC	M	
coho	Thompson	H	H
pink	CC Mainland Inlets	H	
sockeye	Fraser - Cultus	H	H
sockeye	Strait of Georgia - Sakinaw	H	
sockeye	CC	H	
sockeye	Fraser – fall	H	H
sockeye	Skeena wild	H	
chinook	Upper Fraser - earliest timed springs (mostly 4)	M	L
chinook	Lower Fraser - Summers	M	L
chinook	WCVI	M	
chinook	Strait of Georgia	M	L
chum	Johnstone Strait and Georgia Basin	M	
chum	WCVI	M	
chum	QCI	M	
coho	Strait of Georgia including lower Fraser	M	H
coho	CC	M	
coho	QCI	M	
coho	NC	M	
sockeye	Fraser – Early Stuart	M	H
sockeye	Fraser – Early Summer	M	H
sockeye	Nimpkish	M	
sockeye	Babine Lake (enhanced) (BLOP) (Pinkut & Fulton)	M	
sockeye	Alsek	M	
chinook	Taku	L	
chinook	Upper Fraser & Thompson - springs (mostly 5_2)	L	L
chinook	Upper Fraser - Summers	L	L
chinook	Lower Fraser - lates	L	L
chinook	Nimpkish	L	
chinook	Alsek	L	
chinook	Nass	L	
chinook	NC	L	
chinook	Thompson - late summers (4_2)	L	L
chinook	CC	L	
chum	CC	L	
coho	WCVI	L	
coho	Nimpkish	L	
coho	Alsek	L	
coho	Taku	L	
pink	Fraser	L	H
pink	CC	L	
pink	NC	L	
pink	QCI	L	
sockeye	Taku	L	
sockeye	Nass	L	
sockeye	WCVI	L	
sockeye	Fraser – summer	L	H

Rank Total	Conservation Concern	Fishery Impact	
3	H	H	1
2.0	H	M	
	H	L	1
2	M	H	
1.2	M	M	
1	M	L	
2	L	H	2
1.2	L	M	1
1	L	L	1

3=H*(1.5*2)	Tot. Impact of Concern	61
2=H*(1.5*1)		
1.5=H*(1.5*0)		
2=M*(1.5*1)		
1=L*(1.5*0)		

* Shaded rows indicate stocks that are impacted by Southern BC commercial salmon fisheries.

Appendix 2 cont'd.

WCVI COMMERCIAL SALMON FISHERIES			Impact on stocks of concern by fishery by area - WCVI								
Species	Stocks of Concern	Conservation Concern	Area 121 Troll Apr-Jun WCVI Inlets	Area 121 Troll Jul-Sept WCVI Inlets	Area 123 Troll Barkley Sd Inlets	Area 123 Troll Barkley Sd Sockeye	Area 123 Troll Barkley Sd Chum	Area 125 Troll Nootka Sd Chum	Area 126 Troll Nootka Sd Chum	Area 127 Troll Nootka Sd Chum
chinook	Lower Fraser - early springs	H	M	L						
coho	Thompson	H	L	H						
sockeye	Fraser - Cultus	H	L	H						
sockeye	Fraser – fall	H	L	H						
chinook	Upper Fraser - earliest timed springs (mostly 1.)	M	H	L						
chinook	Lower Fraser - Summers	M	H	L						
chinook	WCVI	M	H	L				M		
chinook	Strait of Georgia	M	H	L						
chum	WCVI	M	L	L				H	H	H
coho	Strait of Georgia including lower Fraser	M	L	H						
sockeye	Fraser – Early Stuart	M	L	H						
sockeye	Fraser – Early Summer	M	L	H						
chinook	Upper Fraser & Thompson - springs (mostly 5.)	L	L							
chinook	Upper Fraser - Summers	L		H						
chinook	Lower Fraser - lates	L		H						
chinook	Thompson - late summers (4.)	L	L							
coho	WCVI	L	M	H	L	L	L	L	L	L
pink	Fraser	L		H						
sockeye	WCVI	L		L						
sockeye	Fraser – summer	L		H						

Rank Total	Conservation Concern	Fishery Impact
10	H	H
9	H	M
8	H	L
7	M	H
6	M	M
5	M	L
4	L	H
3	L	M
2	L	L

	Tot. Impact of Concern	30	20	10	10	10	5	5	5

* Closed to commercial troll fishing in September to protect WCVI coho and chinook

Appendix 2 cont'd.

WCVI COMMERCIAL SALMON FISHERIES			Impact on stocks of concern by fishery by area - WCVI							
Species	Stocks of Concern	Conservation Concern	Area G Troll WCVI Chinook	Area G Troll WCVI Sockeye	Area G Troll Barkley Sd. Sockeye	Area B Seine Barkley Sd. Sockeye	Area D Gillnet Barkley Sd. Sockeye	Area D Gillnet Nootka Sd. Chum	Area B Seine Nitinat Chum	Area E Gillnet Nitinat Chum
chinook	Yukon	H								
chinook	Lower Fraser - early springs	H	M	L						
chum	Yukon	H								
chum	NC	H								
coho	Thompson	H	L	H						
pink	CC Mainland Inlets	H								
sockeye	Fraser - Cultus	H	L	H						
sockeye	Strait of Georgia - Sakinaw	H								
sockeye	CC	H								
sockeye	Fraser - L	H	L	H						
sockeye	Skeena wild	H								
sockeye	Henderson	H	L		H	H	H			
chinook	Upper Fraser - earliest timed springs (mostly 4_2)	M	H	L						
chinook	Lower Fraser - Summers	M	H	L						
chinook	WCVI	M	H	L				M		
chinook	Strait of Georgia	M	H	L						
chum	Johnstone Strait and Georgia Basin	M								
chum	WCVI	M	L	L				H	H	H
chum	QCI	M								
coho	Strait of Georgia including lower Fraser	M	L	H						
coho	CC	M								
coho	QCI	M								
coho	NC	M								
sockeye	Fraser - Early Stuart	M	L	H						
sockeye	Fraser - Early Summer	M	L	H						
sockeye	Stikine	M								
t	Babine Lake enhanced (BLDP) (Pinkut & Fulton)	M								
sockeye	Alsek	M								
chinook	Taku	L								
chinook	Upper Fraser & Thompson - springs (mostly 5_2)	L	L							
chinook	Upper Fraser - Summers	L		H						
chinook	Lower Fraser - lates	L		H						
chinook	Stikine	L								
chinook	Alsek	L								
chinook	Nass	L								
chinook	NC	L								
chinook	Thompson - late r [illegible] (4_1)	L	L					L		
chinook	CC	L								
chum	CC	L								
coho	WCVI	L	M	H	L	L	L	L	L	L
coho	Stikine	L								
coho	Alsek	L								
coho	Taku	L								
pink	Fraser	L		H						
pink	CC	L								
pink	NC	L								
pink	QCI	L								
sockeye	Taku	L								
sockeye	Nass	L								
sockeye	WCVI	L		L						
sockeye	Fraser - Late	L		H						

Rank Total	Conservation Concern	Fishery Impact								
9	H	H	0	3	1	1	1	0	0	0
6	H	M	1	0	0	0	0	0	0	0
3	H	L	4	1	0	0	0	0	0	0
6	M	H	4	3	0	0	0	1	1	1
2	M	M	0	0	0	0	0	1	0	0
1	M	L	4	5	0	0	0	0	0	0
3	L	H	0	5	0	0	0	0	0	0
2	L	M	1	0	0	0	0	0	0	0
1	L	L	2	1	1	1	1	1	1	1
		Tot. Impact of Concern	50	69	10	10	10	9	7	7

9=H*H(3*3)
6=H*M(3*2)
3=H*L(3*1)
2=M*L(2*1)
1=L*L(1*1)

* Shaded rows indicate stocks that are impacted by Southern BC commercial salmon fisheries.

Appendix 3. Observer providers for South Coast commercial salmon fisheries.

1) Archipelago Marine Research Ltd.
   2nd Floor – 5252 Head St.
   Victoria, BC
   V9A 5S1

2) D&D Pacific Fisheries Ltd.
   Box 1445
   Gibsons, BC
   V0N 1V0

3) J.O. Thomas & Associates Ltd.
   1370 Kingsway St.
   Vancouver, BC
   V5K 1R4

4) M.C. Wright & Associates
   2231 Neil Drive
   Nanaimo, BC
   V9R 6T5

5) PacifiTech Environmental Consulting
   2213 Cameron Dr.
   Port Alberni, BC
   V9Y 1B1

6) Pacific Coast Fishery Services Inc.
   201 Selby St.
   Nanaimo, BC
   V9R 2R2

7) SilverKing Ventures Ltd.
   Box 1237
   Port McNeill, BC
   VON 2RO

8) West Coast Technical Services
   940 Woodhaven Road
   Sooke, BC
   V0S 1N0